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ABSTRACT

This report presents findings on school leaving, part of a 5-year study on the transition of youth with disabilities from secondary school to early adulthood. Telephone interviews were conducted in 1987 with parents of approximately 8,000 youth (ages 13 to 21 and enrolled in special education in 1985-86) representing all 11 federal special education disability categories. Major findings indicated: approximately half of students with disabilities left secondary school by graduating; almost one-third of school leavers with disabilities were dropouts; absenteeism was frequently a precursor of early school leaving, with dropouts absent an average of 3 weeks during their most recent school year; more than one third of the students had failed at least one course during that year; and the dropout rate was particularly acute for those classified as seriously emotionally disturbed, learning disabled, speech impaired, or mentally retarded. Findings also identified school interventions that can reduce dropout rates in this population, including intervention early in students' school careers and provision of occupationally oriented vocational education. Such efforts are demonstrated as valuable by data indicating substantially higher post-school competitive employment rates by graduates. Appendixes provide an overview of the National Longitudinal Transition Study and study details. (50 references) (DB)

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DROPOUTS WITH DISABILITIES: WHAT DO WE KNOW? WHAT CAN WE DO?

A Report from the National Longitudinal Transition Study of Special Education Students

September 1991

Prepared for:

The Office of Special Education Programs
U.S. Department of Education

Prepared by:

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National Longitudinal Transition Study

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1 INTRODUCTION

In 1983, *A Nation at Risk* raised the consciousness of America regarding the apparent decline in the quality of its educational system and in the performance of its students (National Commission on Excellence in Education, 1983). That report opened a floodgate of criticism of the quality of schools, curricula, textbooks, testing systems, teachers, and students. Business leaders joined policymakers in expressing their fears that the country's ability to be competitive in the world economy would erode unless the young people leaving its educational system had more and better skills that matched the demands to be placed on the labor force of the future. These concerns were echoed more recently in the President's strategy for education reform in the 1990s, *America 2000* (U.S. Department of Education, 1991).

The nation's dropout rate has become a lightning rod for a good deal of the criticism and concern about the education system. The dropout rate, as an indicator of the "holding power" of schools, has become a tool to increase schools' accountability for educational quality. The presumption is that schools can be judged effective only if the educations they offer are capable of retaining their students. This expectation has been codified in one of the six national education goals resulting from the 1990 national Education Summit:

> **Goal 2: By the year 2000, the high school graduation rate will increase to at least 90%.**

This focus on keeping students in school appears justified in light of abundant and compelling evidence that high school dropouts are a social and economic drain on the nation. For example, the William T. Grant Foundation on Work, Family, and Citizenship (1988) suggests that high school dropouts have higher unemployment than all other groups of young people. In 1986, only 55% of dropouts under age 20 were employed; only 31% of male dropouts and 14% of female dropouts were working full time. Although fewer than 20% of the adult population were dropouts, they constituted 66% of the nation's prison population.

A concerted attack on the dropout problem has been evident for several years. At the national level, resources have been invested in demonstration projects to prevent dropping out and in studies of how best to measure it when it occurs. Research has addressed characteristics of students "at risk" of dropping out and characteristics of programs effective

in preventing them from doing it (U.S. General Accounting Office, 1986 and 1987). Many states and local school districts have begun their own initiatives to retain their students.

But the politics, programming, and research on dropouts largely have overlooked students with disabilities, perhaps because their special education programs are assumed to provide the individualized services that should ameliorate whatever risk of dropping out these students might experience. However, recent data call into question this inattention to students with disabilities in the dropout arena. As a group, students with disabilities drop out of school at a significantly higher rate than typical secondary school students (as is discussed more below). If students with disabilities contribute disproportionately to the dropout problem, why are they not actively and explicitly included in efforts to solve it?

One possible explanation for omitting students with disabilities from the dropout research and programming agenda of the past may be that, until recently, there has been little reliable data to demonstrate the size and nature of the dropout problem among these students. To fill the information gap, P.L. 99-457 (1984) required that states report to the federal government on the school-leaving status of students exiting special education. However, school-reported data on school-leaving status have a variety of limitations that result in a general underreporting of dropout rates (Frase, 1989).* Not until 1987 were household-reported data collected nationally on the school-leaving status of students with disabilities. These data, reported here, were collected as part of the National Longitudinal Transition Study of Special Education Students (NLTS), funded by the Office of Special Education Programs (OSEP) of the U.S. Department of Education.

The NLTS was mandated by the U.S. Congress in 1983 to provide information to practitioners, policymakers, researchers, and others regarding the transition of youth with disabilities from secondary school to early adulthood. OSEP contracted with SRI International to determine a design, develop and field test data collection instruments, and select a sample of students for a study that would meet the congressional mandate. In April 1987, under a separate contract, SRI began the actual study.

This 5-year study includes a nationally representative sample of more than 8,000 young people who were ages 13 to 21 and secondary special education students in the 1985-86 school year.** The sample represents youth in all 11 federal special education disability categories (see Appendix A) and permits findings to be generalized nationally for each disability group.

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* For example, in assessing the level of agreement between school reports and parent reports of school completion status, the NLTS found that schools listed 6% of students with a status of transferred/moved at the end of the school year. (Other categories included graduated, dropped out, over-age, promoted/not promoted, institutionalized, incarcerated, expelled, and other.) Of the students who schools thought had transferred/moved, 65% of parents reported they had dropped out.

** Sample sizes for specific data collection instruments are lower than the total sample size (see Appendix A). Sample sizes for specific measures are included in all data tables.

Data reported here were collected in 1987 from telephone interviews with parents,* from school records for the most recent year students attended secondary school, and from a survey of educators in the schools attended by students in the sample. (Appendix A has a more detailed description of data collection, data weighting, and analyses. Full reports on various aspects of sampling and data collection methods also are available; Wagner, Newman, and Shaver, 1989; Javitz and Wagner, 1990.)

Findings from the NLTS suggest four key points regarding school completion for students with disabilities:

- A sizable percentage of students with disabilities drop out of school—a significantly higher percentage than among typical students. The dropout problem is particularly acute for students with some kinds of disabilities—those classified as seriously emotionally disturbed, learning disabled, speech impaired, or mentally retarded (who are 90% of students in secondary special education).
- Dropping out of school is the culmination of a cluster of school performance problems, including high absenteeism and poor grade performance.
- A variety of student characteristics and behaviors are associated with poor school performance and a higher likelihood that students will drop out. Understanding these risk factors can help schools target dropout prevention programs to students most prone to early school leaving.
- Dropping out is not a function solely of student and family factors. There are significant relationships between aspects of students' school programs and student outcomes. Schools can make a difference in their students' performance. Schools can increase the likelihood that students will finish school.

The following sections of this report present NLTS findings that demonstrate these points.

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* For 8% of youth, a parent/guardian was not available to respond to the interview. These were generally cases in which youth lived with another family member or were under the protection of the state and lived with nonrelated adults. In such cases, the adult who was most knowledgeable about the youth was interviewed. Responses of these nonparents are included in the analyses, although interviews are referred to as "parent interviews."

2 THE SCHOOL COMPLETION STATUS OF STUDENTS WITH DISABILITIES

In the general student population, there are three typical modes of leaving secondary school. Students can accumulate the necessary course credits in their high school programs and graduate; they may choose to leave school without graduating (drop out); or they may be involuntarily and permanently suspended or expelled from school (a fairly rare occurrence). Students with disabilities can exit secondary school in these three ways as well. In addition, they may "age out"—stay in school until they reach the legal age limit for receiving special education services without accumulating the necessary credits for graduation. (Age limits vary by state, ranging from 19 to 26 years old; U.S. Department of Education, 1990.) Figure 1 indicates the percentages* of students with disabilities who left secondary school in either the 1985-86 or 1986-87 school year through these four modes.**

Overall, 56% of exiters from high school in a 2-year period graduated,† a percentage quite similar to the graduation percentages of 60% and 59% reported by states for exiters with disabilities for the 1985-86 and 1986-87 school years (U.S. Department of Education, 1988 and 1989). Almost 1 in 3 school leavers with disabilities (32%) dropped out of school, and 4% were suspended or expelled. Fewer than 1 in 10 students (8%) left school because they exceeded the school age limit.

Comparisons with School Leavers in the General Population

Having a benchmark against which to compare the finding that almost a third of exiters with disabilities left school by dropping out gives the statistic further meaning. The NLTS has calculated graduation and dropout percentages for a sample of school leavers from the

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* Percentages and means reported for the NLTS are based on weighted data that make the statistics nationally generalizable. Hence, percentages are weighted population estimates, not percentages of the NLTS sample. Sample sizes reported in tables (indicated as "N") are the actual number of cases on which the particular calculations are based.

** School completion status is a variable based on a combination of parent and school reports, because no single source of data was available for all students. Data refer to the student's most recent year in secondary school. This was the 1986-87 school year for students still in school at the time of the 1987 interview or those who had left school in the preceding year. For students who had been out of secondary school more than 1 year at the time of the interview, their most recent school year was 1985-86. See Appendix B for details on the data sources and definitions of variables.

† The percentage of students graduating is calculated by taking the total number of students with disabilities who left school in the 1985-86 or 1986-87 school year by graduating (with either a regular or special diploma), divided by the total number of students with disabilities leaving secondary school in those years. Graduates were identified by schools and/or parents; 75% of graduates were reported to have received regular diplomas.

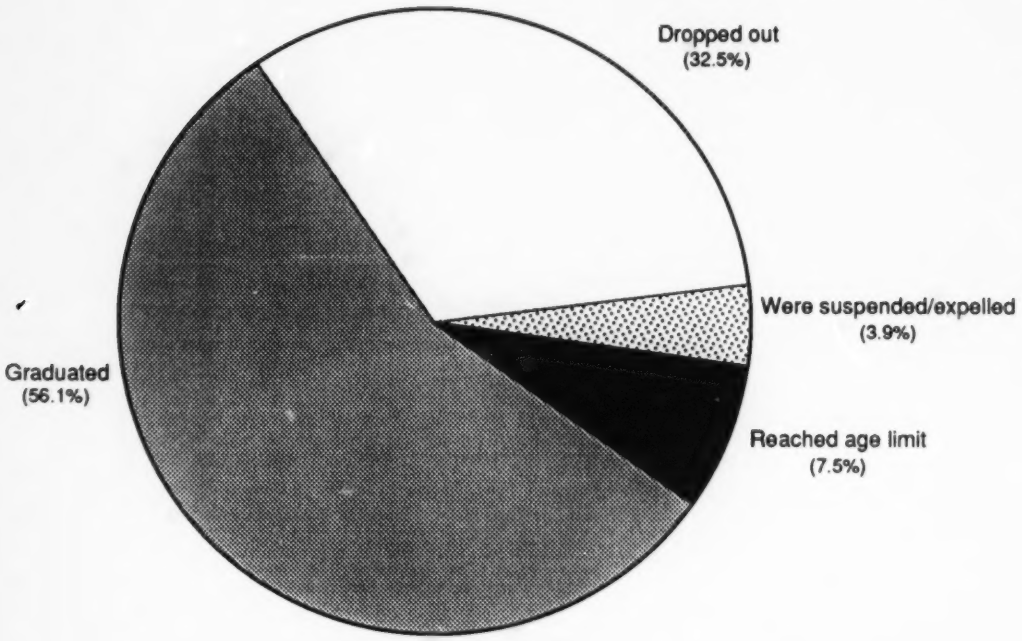

FIGURE 1 MODE OF SCHOOL LEAVING FOR YOUTH WITH DISABILITIES WHO LEFT SECONDARY SCHOOL IN A 2-YEAR PERIOD (n=3,048)

Source: Parent interviews and students' school records.

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general population using data from the National Longitudinal Survey of Youth (NLSY; U.S. Department of Labor). To be comparable to the NLSY, NLTS estimates were recalculated only for school leavers ages 15 to 20, which virtually eliminated youth with disabilities who aged out of school. Also, the NLTS recalculations included among dropouts students who had been suspended or expelled, as was done in the NLSY.

These recalculations permit comparisons between youth with disabilities and the general population of youth. However, the NLTS has demonstrated that youth with disabilities differ from the general population in ways other than the presence of a disability (Marder and Cox, 1991). Youth with disabilities are disproportionately male, minorities, and from low-income households and urban areas, factors that could affect their outcomes relative to the general population of youth. To determine the extent to which differences between youth with disabilities and typical youth resulted from these demographic differences, not from disability-related differences, the NLTS has constructed a second comparison group from the NLSY. This second group includes youth in the general population who have been

reweighted to have the same distribution on selected demographic characteristics (e.g., gender, ethnicity) as youth with disabilities. (See Appendix A for a discussion of the selection and weighting of the NLSY comparison groups.)

Table 1 compares the percentages of 15- to 20-year-old school leavers who graduated and dropped out for (1) youth with disabilities, based on the NLTS; (2) youth with demographic characteristics similar to those of youth with disabilities, based on reweighted data from the NLSY; and (3) the general population of youth, based on the NLSY.

These comparisons show that youth with disabilities were significantly more likely to drop out of school than youth in the general population. Of youth ages 15 to 20 who left secondary school in a 2-year period, 43% of those with disabilities were dropouts (including those suspended or expelled), compared with 24% of youth in the general population ($p<.001$). Further, less than half of this sizable difference between groups resulted from the fact that students with disabilities were disproportionately males, minorities, and from lower-SES households. When these factors were adjusted in the creation of a second comparison group, significant differences remained; 43% of youth with disabilities dropped out vs. 32% of youth who were comparable on selected demographic characteristics ($p<.001$). The percentage of exiters who graduated was correspondingly lower for youth with disabilities: 57% vs. 76% for typical students and 68% for students with demographic characteristics similar to students with disabilities. Clearly, the national goal of graduating

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Table 1

PERCENTAGE OF 15- TO 20-YEAR-OLD SCHOOL LEAVERS WHO GRADUATED AND DROPPED OUT AMONG YOUTH WITH DISABILITIES AND THE GENERAL POPULATION OF YOUTH

	Percentage of Youth Ages 15-20 Leaving Secondary School in a 2-Year Period Who Were:				
Youth Characteristics	Graduates	Dropouts	Age-outs	S.E.	N
Youth with disabilities	57.1	42.9	<.1	2.6	1,620
Youth in the general population with demographic characteristics similar to youth with disabilities	68.4	31.6	0.0	.9	6,595
Youth in the general population	75.6	24.4	0.0	.8	6,595

Source: For youth with disabilities: NLTS parent interviews and students' school records for their most recent school year. For the general population of youth: NLSY youth interviews.

90% of secondary school students implies a much greater increase in graduation rates for students with disabilities than for typical students.

Variations in School Completion Patterns by Disability Category

Examining any outcome measure for students with disabilities as a whole masks the wide variation in experiences between students with different kinds of disabilities. Although NLTS data suggest that dropping out is a pervasive problem among students with disabilities as a group, it is particularly acute for those in some disability categories, but significantly less common among others.* Figure 2 demonstrates this variation by disability category in the extent to which students left secondary school in the 1985-86 or 1986-87

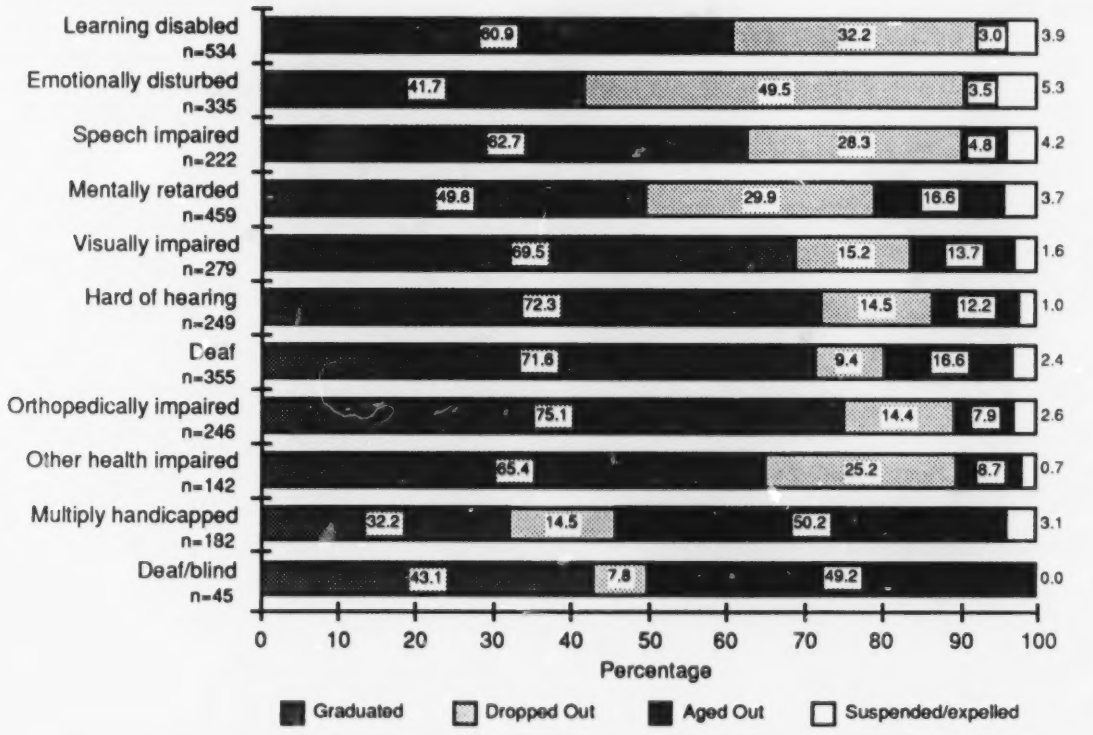

FIGURE 2 MODE OF SCHOOL LEAVING OF SECONDARY SCHOOL EXITERS, BY DISABILITY CATEGORY

Source: Parent interviews and students' school records.

* For crosstabulations throughout this report, youth are assigned to a disability category based on the primary disability designated by the youth's school or district in the 1985-86 school year. Descriptive data are nationally generalizable to youth who were classified as having a particular disability in the 1985-86 school year.

school year by graduating, aging out, dropping out, or being suspended or expelled; youth were aged 15 to 23.

Exiters in the seriously emotionally disturbed category were significantly more likely than youth in any other disability category to have dropped out (50%; $p<.001$). Almost 1 in 3 exiters classified as learning disabled (32%) dropped out, as did 28% of exiters classified as speech impaired and 30% of those with mental retardation. The percentage of exiters who dropped out among those with other health impairments was 25%. Percentages in other categories were generally 15% or below.

Among exiters with sensory or orthopedic impairments, between 70% and 75% graduated, which approaches percentages reported for the general student population. Half or fewer of the exiters in the multiply handicapped (32%), deaf/blind (43%), seriously emotionally disturbed (42%), and mentally retarded (50%) categories graduated.

However, the alternatives to graduation varied for the different categories of youth. For example, nongraduates in the multiply handicapped and deaf/blind categories were most likely to have aged out, whereas those in the seriously emotionally disturbed category were most likely to have dropped out.

Dropping Out Versus Persisting in School

Thus far, the discussion has focused on youth who left school and has assessed the extent to which they graduated, dropped out, aged out, or were suspended or expelled. For younger students, however, choices about school participation are not between graduating and dropping out but between staying in school and dropping out. Here we expand our analysis of dropout behavior by comparing dropping out to school persistence and examining characteristics that distinguish youth who chose those two paths. For our purposes, school persisters were those who, at the end of their most recent school year, were still in school, or students who had stayed in school until they graduated or aged out.

Table 2 indicates the percentage of students who were in secondary special education in the 1985-86 school year and who were still in school or exited by various means by 1987.* Two-thirds of youth still were enrolled in school at the end of the 1986-87 school year. Graduates constituted 18% of youth, while age-outs and those suspended or expelled were 2% and 1% of youth, respectively. Youth who had dropped out accounted for 11% of youth with disabilities. By grade level, the percentage of youth who were dropouts ranged from 4% of those who had made it to 12th grade to 14% of students in 11th grade.

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* These figures are similar to "event rate" calculations of dropping out (Frase, 1989), although the NLTS calculation includes youth who left school in either of two school years (1985-86 or 1986-87), rather than the more commonly reported rates for single school years.

Table 2

STATUS AT THE END OF THE 1986-87 SCHOOL YEAR OF STUDENTS WHO HAD BEEN IN SECONDARY SPECIAL EDUCATION IN 1985-86

	Percentage of Students Who Were:					
Student Characteristics	In School	Graduates	Ageouts	Dropouts	Suspended/ Expelled	N
Total†	67.1 (1.2)	18.4 (1.0)	2.5 (.4)	10.7 (.8)	1.3 (.3)	7,974
Grade level in 1986-87:						
7 or 8	90.5 (2.9)	NA	.1 (.3)	8.0 (2.7)	1.4 (1.2)	571
9	86.2 (2.6)	NA	.1 (.2)	12.0 (2.5)	1.7 (1.0)	891
10	87.9 (2.9)	NA	.2 (.3)	10.2 (2.7)	1.7 (1.2)	972
11	79.7 (2.9)	6.0 (1.7)	.1 (.2)	13.7 (2.5)	.5 (.5)	1,010
12	7.9 (1.6)	85.4 (2.1)	1.8 (.8)	4.4 (1.2)	.6 (.5)	1,414
Unassigned to grade level	71.1 (3.4)	10.1 (2.3)	7.9 (2.0)	8.8 (2.1)	2.2 (1.1)	995

Note: Standard errors are in parentheses.

Source: Parent interviews and students' school records.

† The sample size for the total sample is considerably larger than for grade level because school status was calculated from either the parent interview or school records, whereas grade level was gathered from school records only, which were available for only part of the sample.

These figures regarding the propensity to drop out among students with disabilities are sobering. These youth already experience whatever obstacles to adult independence are posed by their disabilities. At the end of a given school year, 11% of students also take on the obstacles inherent in leaving school without graduating. Although dropping out of school is not an irrevocable decision, other NLTS analyses suggest that few young people with disabilities who dropped out had returned to school in the first 2 years after leaving (Wagner, 1991c). Most continue into their early adult years with two strikes against them.

3 THE RELATIONSHIP OF SCHOOL PERFORMANCE TO SCHOOL COMPLETION

Dropping out of school often is not a sudden action but the culmination of a sometimes lengthy process of disengagement from school. Research on both typical students (Bachman, Green, and Wirtanen, 1971) and those with disabilities (Thornton, Liu, Morrow, and Zigmond, 1987) has discovered significant relationships between dropping out and student behaviors exhibited as early as the elementary school years. Indeed, dropping out of school appears to be only one component of a cluster of indicators of poor school performance.

Parents of dropouts confirm the link between poor school performance and the choice to leave school without graduating. When asked why their children with disabilities dropped out of school, doing poorly in school and not liking school were the two most commonly cited explanations (Wagner, 1991). Teachers also relate dropping out to poor school performance. In a recent study of dropouts from special education in California (Jay and Padilla, 1987), educators described special education dropouts as students who had poor attendance, were failing in school, were not well integrated socially, and did not see school as relevant to their lives. In this respect, students with disabilities do not seem to differ greatly from typical students, among whom poor performance in school also strongly relates to later decisions to drop out (Raber, 1990; Eckstrom, Goertz, Pollack, and Rock, 1986).

NLTS data presented here focus on two measures of school performance for students' most recent secondary school year:

- Students' school attendance (average days absent from school), a measure of engagement in the educational process.*

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* Absenteeism data were collected on the school record abstract form, but were missing on 15% of forms. No significant differences were found between those for whom data were provided and those for whom data were missing on the following factors: functional ability scale scores, IQ scores, GPA, and attendance at a special school. There was, however, a significantly greater absence of data for students in middle school grade levels (7 or 8) than higher grades (23% missing vs. 11% to 13% missing; $p<.01$). Because younger students had somewhat lower absenteeism, the underrepresentation of these students would slightly inflate overall absenteeism levels, particularly for disability categories that had relatively more students at those grade levels (e.g., speech impaired; Marder and Cox, 1991).

- Whether students who received grades* earned one or more failing grades.**

Many students with disabilities were having serious difficulties in school, as measured by absenteeism and course grade failure. In their most recent school year, students with disabilities averaged 15 days absent from school; almost 1 in 4 students was absent 20 days or more. Almost one-third of students (31%) had received one or more failing grades.

These school difficulties are powerfully connected to students' decisions to drop out. Table 3 demonstrates that the percentage of youth who dropped out of school rather than persisting increased markedly as absenteeism increased. For example, only 5% of students who were absent 10 days or fewer in their last school year dropped out, compared with 10% of those absent 21 to 30 days and 27% of those absent more than 30 days ($p<.001$). Similarly, the dropout rate was significantly higher for students who had failed a course in their most recent school year (17%) than for students who passed all their courses (6%; $p<.001$). These relationships were equally strong for students who shared the same disability classification. For example, among students with learning disabilities, the estimated rate of dropping out was 16% for students who had failed a course, compared with only 4% for those who did not ($p<.001$), independent of other student and school characteristics (Wagner, 1990). Multivariate analyses for youth in all disability categories, presented later in this volume, further demonstrate that the relationships between school performance and dropping out are evident even when analyses control for differences in student, household, school, and community characteristics.

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* NLTS data reveal that 11% of students with disabilities did not receive grades in any courses in their most recent year in secondary school. Receiving grades was strongly related to the nature and severity of students' disabilities. For example, only 5% of students categorized as learning disabled did not receive any grades, whereas 24% of those with mental retardation did not receive any grades. More than half of students with low functional mental skills did not receive grades (55%), compared with only 4% of students with high functional mental skills. Almost two-thirds of students who were not assigned to a specific grade level and 54% of those who attended special schools did not receive grades in any courses. Hence, when we analyze course grades as measures of school performance, we are "creaming" the special education student population by eliminating from the analysis students with more severe disabilities and lower functional skills. These students tend to age out of school rather than drop out. Eliminating these students from analyses by including course grade data results in somewhat higher dropout rates than would be the case if all students were included.

** Readers are cautioned that failure rates may actually have been marginally higher than those reported here. There is reason to believe that the grades abstracted from students' records may slightly overestimate grade performance for some students. For a subsample of students, transcripts were collected and grades were compared with those reported by data abstractors on the school record abstract form. In a handful of cases, failed courses were not included on the record abstract form because students received no credit for them. It is unknown to what extent this form of omission characterizes other record abstract data; to the extent that it does, failure rates are underestimated.

Table 3

VARIATIONS IN DROPOUT RATE BY SCHOOL PERFORMANCE MEASURES FOR YOUTH WITH DISABILITIES

School Performance in Most Recent Year	Students Who Dropped Out		
	Percent	S.E.	N
Days absent from school			
≤10	5.1	1.0	2,972
11 to 20	8.2	1.8	1,156
21 to 30	10.5	3.0	457
>30	26.9	4.4	520
Student failed one or more courses			
Yes	16.7	2.2	1,184
No	5.9	.9	4,410

Source: School performance data are from students' school records for their most recent school year. Dropout data are from school records or parent interviews.

However, it is important to point out that, despite the strong association between school performance and school completion, poor school performance does not necessarily sound a death knell for the probability of students' completing school. Although the dropout rate was markedly higher for those with high absenteeism, almost three-fourths of students who missed more than 30 days of school in their most recent school year still completed the year. Similarly, the vast majority of those who failed a course (83%) did not drop out that school year. The cumulative effects of absenteeism and course failure may mean that such students are more likely to drop out in subsequent years, but it would be premature for students or the educators who serve them to "write off" the possibility of completing school because of poor performance in a given year.

Nevertheless, poor school performance is an obstacle to school completion, an obstacle to be minimized in whatever ways it can be. But how do schools improve student attendance and grade performance among students with disabilities? A first step is to recognize the students who need help; factors that distinguish those most at risk of poor performance are presented in the next section.

4 WHO DROPS OUT OF SCHOOL?

Considerable research has focused on identifying the characteristics of students who drop out of school. Such characteristics can be considered risk factors, the knowledge of which would enable educators to target dropout prevention activities to students most likely to leave school prematurely. However, most of these efforts have focused on the general student population rather than on students with disabilities. (See, for example, Ekstrom et al., 1986; Hendrick, MacMillan, and Balow, 1989; Rumberger, 1983 and 1987; Fetters, Brown, and Owings, 1984; Jones, 1986; Baro and Kolstad, 1986; Bachman, Green, and Wirtanen, 1971; U.S. General Accounting Office, 1986; Peng and Takai, 1987; U.S. Bureau of the Census, 1987). Here we consider whether the characteristics or risk factors identified for dropouts as a whole also apply to students with disabilities who drop out of school.

The NLTS has drawn on available research on both typical students and those with disabilities to construct a conceptual framework that specifies factors expected to relate to the likelihood that students will do poorly in school and drop out. Figure 3 depicts these hypothesized relationships. This section focuses on the individual, household, and community characteristics of students, highlighted in Box A, and extracurricular activities of students involving employment and social activities, included in Box D. By examining the relationships between these factors and school performance and completion, we will further our understanding of who had trouble in school.

Our first look at relationships of these factors to school performance and dropout behavior focuses on each factor individually. However, because many of the factors are interrelated, multivariate analysis is necessary to disentangle the independent relationships of each factor to our dependent measures. The discussion of individual relationships will be followed by presentation of multivariate analysis findings.

Two measures of school performance are the focus of both bivariate and multivariate analyses: the number of days students were absent in the most recent school year, and a dichotomous variable indicating whether the student received a failing grade in the most recent school year. A third dependent measure is a dichotomous variable indicating whether students dropped out rather than persisting in school (i.e., were in school or had graduated or aged out).

Relationships between these measures of school performance and school completion and the factors that the conceptual framework suggests influence them are reported below. (Appendix B describes these variables in greater detail.)

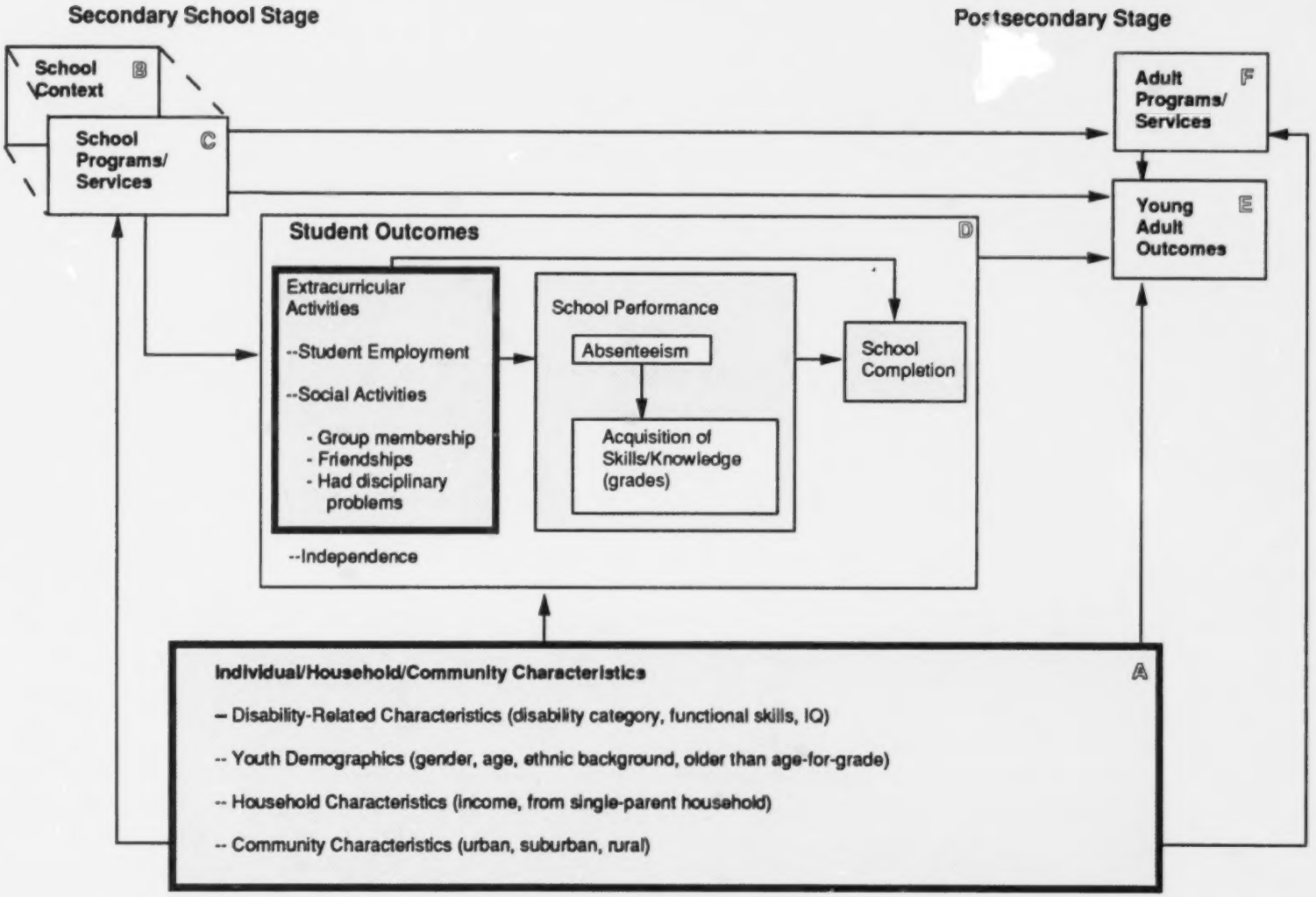

FIGURE 3 THE RELATIONSHIP OF STUDENT, HOUSEHOLD, AND COMMUNITY FACTORS TO SCHOOL COMPLETION

Disability-Related Characteristics

- ***Disability category.*** Analyses presented earlier demonstrated the marked differences in the incidence of dropping out for youth in different disability categories. Further supporting the relationships between absenteeism, course failure, and dropping out, Figure 4 demonstrates that the categories of youth with high dropout rates also generally were those with poor school attendance and poor grades. For example, students with emotional disturbances had the highest dropout rate, as well as the highest absenteeism (18 days) and the highest probability of failing a course (44%). Conversely, students classified as deaf had among the best student outcomes, regardless of which measure we consider.

- ***Self-care abilities.*** Beyond differences in student outcomes associated with disability type, differences related to functional abilities also are apparent. Self-care skills were measured on a scale, ranging from 3 to 12, created from parents' reports of how well their children could dress themselves completely, feed themselves completely, and get places outside the home. For youth in relevant disability categories, students with greater physical functioning would be expected to have lower absenteeism due to illness or treatment of physical disabilities and higher overall performance. Table 4 shows somewhat higher absenteeism for lower-functioning students, as expected, although the relationship falls just short of statistical significance. Contrary to expectations, however, higher-functioning youth were significantly more likely to have failed a course (10% for low-functioning students compared with 33% for high-functioning students; $p<.001$). No systematic differences in dropout rates were apparent.

- ***Functional mental skills.*** Functional mental skills were measured on a scale, ranging from 4 to 16, created from parents' reports of how well their children could look up telephone numbers in the phone book and use the phone, tell time on a clock with hands, read and understand common signs, and count change. One could expect that youth with greater ability to translate these basic mental processes into everyday activities would have better identification with school and, therefore, higher performance. The opposite relationship is demonstrated in Table 4. Compared with low-functioning students, high-functioning students had a significantly higher rate of receiving a failing grade (34% vs. 14%; $p<.001$), perhaps because they were taking more academically challenging courses. There is no significant relationship to absenteeism or dropping out.

- ***Measured IQ.*** Research has demonstrated that grades are a function, in part, of cognitive ability for nondisabled youth (Fetters, Brown, and Owings, 1984; Bachman, Green, and Wirtanen, 1971). NLTS data in Table 4 give mixed messages regarding the relationship between IQ (IQ scores were taken from students' school records for their most recent year in secondary school) and student outcomes for students with disabilities. Only in the case of dropping out did the relationship between IQ scores and student outcomes approach linearity and statistical significance; students with IQs above 110 were significantly less likely to dropout than students in any other IQ category ($p<.01$ and .001).

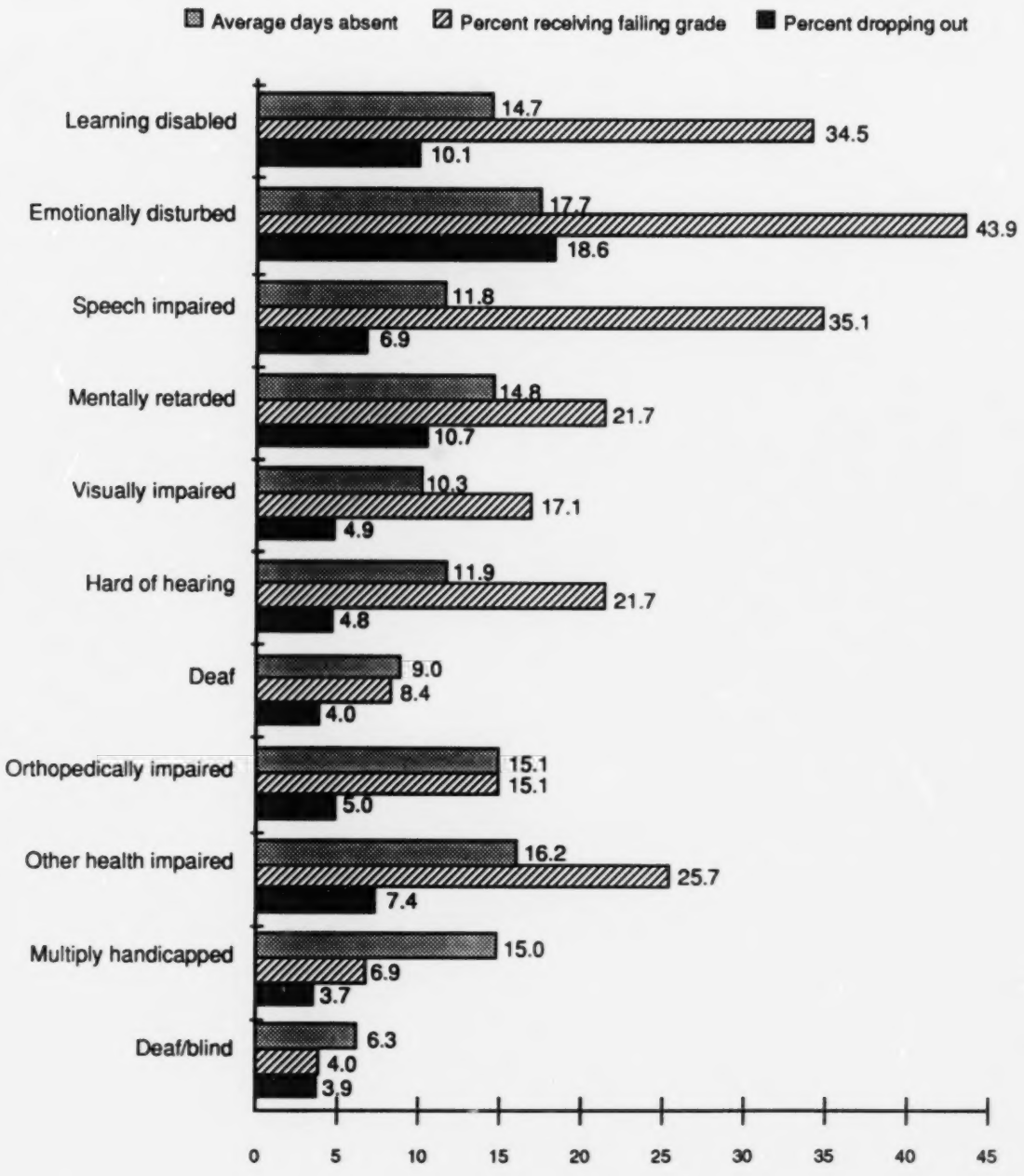

FIGURE 4 VARIATIONS IN SCHOOL PERFORMANCE AND SCHOOL COMPLETION BY DISABILITY CATEGORY

Table 4

VARIATIONS IN SCHOOL PERFORMANCE AND SCHOOL COMPLETION BY FUNCTIONAL ABILITIES

Disability-Related Characteristics	Number of Days Absent			Students Failing One or More Courses			Students Who Dropped Out		
	Mean	S.E.	N	Percent	S.E.	N	Percent	S.E.	N
Self-care ability scale score:†									
Low (3 to 6)	19.2	2.7	208	10.5	6.5	104	6.0	2.6	537
Medium (7 to 10)	13.2	1.7	659	19.0	5.6	360	5.6	2.1	921
High (11 or 12)	14.6	.6	3,149	32.8	1.9	2,681	9.9	1.0	5,226
Functional mental skills ability scale score:§									
Low (4 to 8)	13.5	1.16	523	14.4	5.2	214	6.6	2.1	896
Medium (9 to 14)	14.5	1.0	1,614	29.2	3.0	1,187	10.5	1.5	2,542
High (15 or 16)	14.6	.8	1,806	34.5	2.5	1,691	9.4	1.2	3,103
IQ									
≤ 74	14.0	.8	1,468	24.0	2.4	1,038	16.5	2.0	563
75 to 90	14.9	.9	1,220	39.2	3.0	1,057	10.0	1.8	1,305
91 to 110	15.1	1.2	846	35.8	4.0	661	10.6	2.4	956
> 110	11.2	1.7	237	30.4	9.3	172	1.7	2.4	278

† Parents rated on a 4-point scale youths' abilities to dress themselves, feed themselves, and get around outside the home. Ratings were summed to create a scale ranging from 3 to 12.

§ Parents rated on a 4-point scale youths' abilities to tell time on a clock with hands, look up telephone numbers and use the phone, count change, and read common signs. Ratings were summed to create a scale ranging from 4 to 16.

Source: IQ scores and performance data are from students' school records. Other data are from parent interviews.

Regarding absenteeism, only students at the highest IQ level (greater than 110; 11 days absent) showed significantly lower absenteeism than other students, who were quite similar in being absent 14 or 15 days ($p<.05$). Students with IQs below 75 were significantly less likely than students in the low-normal and normal ranges of intelligence to have received a failing grade (24% vs. 39% and 36%; $p<.05$). In multivariate analyses, IQ did not have a statistically significant, independent relationship to any of the three outcomes, as discussed in greater detail in later sections.

Youth Demographic, Household, and Community Characteristics

Various studies regarding student outcomes for typical students suggest that gender, ethnicity, and socioeconomic status, in some combination, relate to school performance

(Eckstrom et al., 1986; U.S. Bureau of the Census, 1987). Research in special education regarding school performance and student characteristics is sparse, but some suggests that demographic factors may not be as salient in predicting some aspects of school performance for youth with disabilities as for other students (Thornton et al., 1987). Data regarding such relationships are presented in Table 5.

Table 5

VARIATIONS IN SCHOOL PERFORMANCE AND SCHOOL COMPLETION BY INDIVIDUAL, HOUSEHOLD, AND COMMUNITY CHARACTERISTICS

Characteristics	Number of Days Absent			Students Failing One or More Courses			Students Who Dropped Out		
	Mean	S.E.	N	Percent	S.E.	N	Percent	S.E.	N
Youth demographics									
Gender									
Male	15.1	.6	3,174	35.0	1.9	2,547	10.6	.8	4,993
Female	14.6	.8	2,012	29.0	2.7	1,559	9.9	1.4	3,191
Youth's age in last school year									
≤ 16	13.8	.9	1,388	35.2	3.0	1,222	5.2	1.1	2,266
17 or 18	16.1	.8	1,981	36.5	2.5	1,614	13.9	1.4	2,947
19 or 20	14.9	.9	1,292	24.7	2.7	998	13.0	1.6	2,087
>20	12.8	1.3	493	9.5	3.1	228	6.9	1.6	898
Ethnic background									
White	12.9	.6	2,786	28.2	2.0	2,192	10.2	1.1	4,450
Black	16.9	1.3	970	43.9	4.3	667	9.3	1.8	1,672
Hispanic	23.0	2.8	353	33.6	7.1	335	10.9	2.9	750
Other	12.5	2.2	114	19.8	9.7	109	6.1	2.2	197
Student was older than typical age-for-grade									
Yes	15.5	.6	3,323	35.0	1.9	2,835	10.7	1.1	4,993
No	13.7	1.1	961	33.4	3.6	903	5.2	1.6	1,117
Household characteristics									
Annual income									
≤ $25,000	16.0	.8	2,098	32.2	2.5	1,591	11.3	1.3	3,484
> $25,000	11.9	.7	1,622	29.7	2.9	1,334	5.7	1.1	2,649
Youth was from single-parent household									
Yes	18.3	1.2	1,313	34.6	3.4	993	11.9	1.7	2,285
No	12.8	.6	2,692	30.2	2.2	2,146	7.7	1.0	4,409
Community characteristics									
Attended school in area that was									
Urban	18.7	1.2	1,475	40.2	3.4	1,411	10.8	1.7	2,480
Suburban	13.4	.8	1,507	31.2	2.7	1,453	7.6	1.3	2,190
Rural	13.6	.7	1,022	30.2	2.5	1,023	9.6	1.4	1,407

Source: Individual and household characteristics are from parent interviews. Urbanicity data are from Quality Education Data. School performance data are from students' school records from their most recent school year.

No significant differences in student outcomes were noted between male and female students in these bivariate analyses. However, significant differences iwere noted for the following characteristics:

- ***Age.*** Equivocal results regarding the relationship of age to student outcomes are evident in Table 5. Students older than 20 were absent significantly less often than students who were 17 or 18, for example, (13 days vs. 16 days; $p<.05$) and were significantly less likely to have failed a course (10% vs. 36%; $p<.01$) and to have dropped out (7% vs. 14%; $p<.001$). However, only this oldest category of students differed consistently from others. These findings probably result from the confounding effects of age and disability. Older students who were still in school generally were more severely impaired and those most likely to age out of school. Multivariate analyses, presented later, show that only the likelihood of receiving a failing grade differed significantly by age, with younger students experiencing a greater probability of course failure.

- ***Ethnicity.*** NLTS research has documented the relative educational disadvantage that minority youth with disabilities experience. White students were absent significantly less than blacks or Hispanics (13 days vs. 17 or 23 days; $p<.01$ and .001). They also were significantly less likely than black students to have received a failing course grade (28% vs. 44%; $p<.001$). However, no significant differences in the dropout rate are associated with ethnicity in this bivariate analysis.

- ***Being older than the typical age-for-grade.*** More than three-fourths of secondary students with disabilities were older than the typical age of students at their grade level, suggesting that many of them had been retained in grade previously. Research on factors related to educational achievement by Bachman, Green, and Wirtenan (1971) suggests that "nothing succeeds like success and nothing predicts future success like past success." One could expect youth who were older than age-for-grade to have poorer student outcomes. Students who were older than the typical age for their grade level were more than twice as likely as others to drop out of school (11% vs. 5%; $p<.01$). This relationship falls just short of statistical significance in the multivariate analysis reported later in this section. However, Table 5 reveals no significant relationship between being older than the typical age-for-grade and either absenteeism or course failure.

- ***Socioeconomic status.*** Similar to findings for minority youth, research has documented the negative effects of poverty on the school experiences of adolescents and young adults, whether measured by household income or parent education; we expect similar findings. Because poverty is often characteristic of single-parent households, we also expect young people from single-parent households to demonstrate less positive student outcomes than youth from two-parent households.

  All measures associated with higher socioeconomic status were significantly related to lower absenteeism. Students from higher-income households had significantly lower absenteeism compared with lower-income students (12 days vs. 16 days; $p<.001$), as did those from two-parent compared with single-parent households (13 days vs. 18 days; $p<.001$) and those from suburban or rural areas compared with those from urban areas (13 or 14 days vs. 19 days; $p<.001$). Receipt of failing grades was less strongly related to SES in these

bivariate analyses, the only significant differences being between urban students and rural students (40% vs. 30%; $p<.05$). The dropout rate was significantly higher for poorer students (11% vs. 6%; $p<.001$) and for those from single-parent households (12% vs. 8%; $p<.05$).

Extracurricular Activities

A further category of student factors expected to relate to student outcomes involves students' extracurricular activities. Much previous research has demonstrated that youth engage in activities and exhibit behaviors that influence aspects of their school performance (see, for example, Jay and and Padilla, 1987; Bachman, Green, and Wirtanen, 1971; U.S. General Accounting Office, 1987; Wehlage and Rutter, 1986; Vito and Connell, 1988; Zigmond, 1987; Alpert and Dunham, 1986; Mahan and Johnson, 1983; Thornton et al., 1987). We have considered the relationship between school performance and completion and the several factors discussed below and presented in Table 6.

Table 6

VARIATIONS IN SCHOOL PERFORMANCE AND SCHOOL COMPLETION BY SELECTED STUDENT ACTIVITIES AND BEHAVIORS

Behavioral Characteristics	Number of Days Absent			Students Failing One or More Courses			Students Who Dropped Out		
	Mean	S.E.	N	Percent	S.E.	N	Percent	S.E.	N
Youth had a job in the past year									
Yes	13.7	.7	2,115	29.3	2.2	2,320	7.2	1.1	3,144
No	15.4	1.0	1,521	31.7	3.0	1,646	4.2	1.1	2,488
Youth belonged to school/ community group in the past year									
Yes	10.9	.7	1,609	24.2	2.6	1,743	2.4	.8	2,419
No	17.0	.9	1,889	34.4	2.4	2,074	7.7	1.1	3,082
Youth saw friends									
Less than once per week	13.3	1.7	685	13.5	3.5	749	5.0	1.8	1,098
Once per week	14.0	1.8	492	29.6	5.1	543	6.9	2.4	748
2 or 3 days per week	12.6	1.0	857	26.6	3.4	955	6.3	1.6	1,363
4 or 5 days per week	13.8	1.5	487	33.9	4.8	525	3.8	1.6	756
6 or 7 days per week	16.9	1.2	898	38.8	3.7	963	6.0	1.4	1,442
Youth had disciplinary problems									
Yes	23.3	2.2	299	46.6	5.6	334	28.5	3.3	786
No	13.0	.6	3,219	27.4	1.9	3,508	4.4	.7	5,989

Source: Parent interviews and students' school records from their most recent school year.

The NLTS examined the relationship between students having a job at some time during the year (including the summer) and their school performance during that year. There is some controversy regarding whether student employment enhances students' skills and work-related behaviors (Panel on Youth, 1974) or whether it poses a threat to school performance by competing with school for students' time and energy (Greenberger and Steinberg, 1986). Among youth with disabilities, NLTS data reveal no significant relationship between having had a job in the preceding year and student outcomes in that year. Significant relationships were found, however, for the following factors:

- ***Group membership.*** As a proxy for social bonds, whether students belonged to a school or community group in the preceding year is expected to reflect school bonding and be related to better outcomes. Table 6 supports this expectation. Group members were absent significantly less often than nonmembers (11 days vs. 17 days; $p<.001$) and were significantly less likely to have received a failing grade (24% vs. 34%; $p<.001$) and to have dropped out (2% vs. 8%; $p<.001$).

- ***Frequency of seeing friends.*** Other NLTS research (Newman, 1991a and b) suggests that students who spent a significant amount of time seeing friends outside of school may have been doing so at the cost of more productive activities. Hence, one would expect students who spent more time socializing to have lower school achievement. Regarding receipt of failing grades, this expectation is confirmed. Those who saw friends outside of school less than once per week were significantly less likely to receive a failing grade than students who saw friends more often (14% vs. 27% or more; $p<.01$), although there were no differences among youth who saw friends once a week or more often. Other school outcome measures did not relate systematically or significantly with frequency of seeing friends in these bivariate analyses, although multivariate results demonstrated significant independent relationships to absenteeism, but not to the likelihood of dropping out.

- ***Having had disciplinary problems.*** The NLTS constructed a variable indicating whether youth had had one or more of the following disciplinary problems: being suspended or expelled from school in the preceding year, being fired from the student's preceding job, or ever being arrested. Data on being fired or arrested come from parent reports and those regarding being suspended or expelled from school come from school records or parent reports. Although this variable focuses largely on behaviors in the preceding year, it is a gross indicator of youth whose behaviors suggested that they had trouble fitting in or abiding by rules needed to maintain their social roles as students, workers, or members of society generally. Hence, it is expected to relate negatively to student outcomes, an expectation confirmed in Table 6. Students with disciplinary problems were absent significantly more often (23 days vs. 13 days; $p<.001$) and were significantly more likely to have received a failing grade (47% vs. 27%; $p<.01$) and to have dropped out (28% vs. 4%; $p<.001$).

Multivariate Analyses of Student Characteristics and Behaviors Related to School Performance

Although many interesting relationships were discussed above, identifying the independent relationships between student outcomes and behavioral or household factors, for example, requires multivariate analyses to hold constant the interrelationships among the factors. The results of multivariate analyses are summarized here.* The discussion first addresses the relative power of the analyses to explain variations in school performance measures. Then, factors significantly related to student outcomes are presented. Finally, the cumulative effects of various factors on student outcomes are considered.

A multivariate regression analysis of student absenteeism reveals that most of the variation in absenteeism remains unexplained by the factors in our analysis (r^2=.12). Only about one-fourth of the explained variation was attributable to disability-related factors (r^2=.03). Demographic factors and student behaviors added significantly to the explanatory power of the analysis.

Logit analyses, conducted to explain variations in receipt of failing grades and of dropping out, do not yield a statistic that indicates the amount of variation explained by the analysis, which would be comparable to an r^2 for a regression analysis. The χ^2 for the analysis of course failure was significantly higher than for the analysis of dropping out (517 vs. 295; $p<.001$), indicating that the independent variables included in the analyses were better predictors of course failure than of dropping out.

Several factors were found to be significantly associated with school performance, as summarized in Table 7. This table presents the estimated change in the average number of days absent and the estimated percentage points change in the probabilities of course failure and dropping out that were associated with each variable in the models.

Table 7 confirms the strong relationships among the three outcome measures. Students with higher absenteeism were significantly more likely to have received a failing grade, independent of other factors. For example, students who missed 18 days of school were estimated to be 8 percentage points more likely to have received a failing grade than students absent 8 days. In fact, differences of even a few days in students' absenteeism can influence other aspects of their school performance. Students absent 18 days were

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* Appendix C, Tables 1 and 2, present the unweighted means of all variables in the full sample of students and in each multivariate analysis and their correlations with student outcomes. However, because the analyses include a variable indicating whether the student was older than the typical age-for-grade, only students assigned to a grade level were included, resulting in a lower percentage of youth with severe impairments and a higher percentage of youth taking occupationally oriented vocational education, for example. Correlations did not differ significantly, however. Even so, conservatively, findings presented here should be interpreted as generalizing to students assigned to grade levels.

Table 7

ESTIMATED CHANGE IN STUDENT OUTCOMES ASSOCIATED WITH DISABILITY, INDIVIDUAL, HOUSEHOLD, COMMUNITY, AND BEHAVIORAL CHARACTERISTICS OF STUDENTS WITH DISABILITIES

	Estimated Change in: Average Number of Days Absent	Rate of Course Failure (Percentage Points)	Rate of Dropping Out (Percentage Points)	For Increment
School performance				
Student absenteeism	NA	8.3***	1.6***	18 days vs. 8 days
Student failed one or more courses	NA	NA	6.8***	Yes vs. no
Disability characteristics				
Youth classified as:†				
Emotionally disturbed	-1.5	6.2	2.1	Emotionally disturbed vs. learning disabled
Speech impaired	-4.9***	.4	-1.1	Speech impaired vs. learning disabled
Mildly/moderately mentally retarded	-1.4	-6.8	-1.9	Mentally retarded vs. learning disabled
Deaf	-5.4***	-14.7***	-2.2	Deaf vs. learning disabled
Hard of hearing	-4.6***	-8.3	-4.7	Hard of hearing vs. learning disabled
Visually impaired	-3.3**	-13.2**	.0	Visually impaired vs. learning disabled
Orthopedically impaired	-2.0	-11.4*	-4.0	Orthopedically impaired vs. learning disabled
Other health impaired	1.4	-14.2**	-2.9	Other health impaired vs. learning disabled
Severely impaired (SMR, multiply handicapped)	-2.8*	-17.8**	-5.2*	Severely impaired vs. learning disabled
Functional mental skills scale score	1.1*	2.0	1.0	High (16) vs. medium (12)
Self-care ability scale score	-2.5***	3.2	.5	High (11) vs. medium (8)
IQ score	.7	-1.9	.2	100 vs. 80
Individual characteristics				
Age in most recent school year	.7	-7.9**	2.0	19 vs. 15
Youth was male	-.7	8.1***	-1.8	Yes vs. no
Youth was minority	.5	6.0*	-2.6*	Yes vs. no
Student was older than typical age-for-grade	.5	4.2	2.4	Yes vs. no
Household characteristics				
Household income (5-category scale)	-2.0***	-4.5*	-.2	$38,000 to $50,000 vs. <$12,000
Student was from single-parent household	2.2***	-1.0	1.1	Yes vs. no
Community characteristics				
Student attended school in:				
Urban area	2.1**	1.8	-.4	Urban vs. suburban
Rural area	-1.3	1.2	2.2	Rural vs. suburban
Student behaviors				
Student had a job	-.3	-3.4	-.1	Yes vs. no
Student belonged to school/community group	-2.6***	-6.4**	-3.8**	Yes vs. no
Frequency of seeing friends (6-category scale)	.6**	4.0**	-.6	4 or 5 days/week vs. once/week
Has had disciplinary problems	8.7***	8.6*	14.2***	Yes vs. no

* $p < .05$; ** $p < .01$; *** $p < .001$.

† Variables regarding students' primary disability were constructed somewhat differently for multivariate analysis purposes than for the descriptive analyses reported thus far, to take advantage of more current and complete information on disability. See Appendix C for details.

estimated to be 2 percentage points more likely to drop out than students who missed 8 days, irrespective of their academic performance or other characteristics. Failing a course also increased the estimated likelihood of dropping out by 7 percentage points.

Although aspects of school performance were powerfully related, other factors also were shown to have independent relationships to how students did in school. Course failure resulted from more than poor attendance; dropping out was a response to more than poor grades.

Disability-Related Characteristics

As was suggested in the descriptive analyses earlier in this chapter, school performance varied significantly by disability category. For example, when compared with students with learning disabilities, deaf youth were absent significantly less and were significantly less likely to fail a course, independent of other factors. We estimate that students who were deaf averaged about 5 fewer days absent from school and were 15 percentage points less likely to fail a course than were students with learning disabilities, independent of other factors.

Measures of functional abilities also were significantly related to absenteeism, independent of a student's disability category. However, the measures of functional mental skills and self-care skills operated in opposite directions. Students with high self-care skills had significantly lower absenteeism than students with lower self-care abilities. Conversely, students with high functional mental skills had significantly higher absenteeism than students with lower functional abilities. The two measures of functional abilities may be distinguishing different causes of absenteeism. Students with low self-care abilities generally had physical or health-related disabilities, which may have resulted in high involuntary absenteeism due to illness or treatment. Students with higher functional mental skills may have had more activities that competed with school for students' commitments and energies, resulting in higher voluntary absenteeism. No significant relationships were found between functional skills and either course failure or dropping out, independent of other disability measures and student characteristics.

Youth Demographic, Household, and Community Characteristics

Younger students and males were significantly more likely than others to have received a failing course grade. For example, 15-year-old students were estimated to be 8 percentage points more likely to have received a failing grade than 19-year-olds, independent of disability characteristics, demographics, or student behaviors. Confirming findings from research on the general student population (e.g., Eckstrom et al., 1986), males with disabilities were estimated to be 8 percentage points more likely than females to have received a failing grade. This gender difference is independent of behaviors included in the model that often are more readily associated with male students, such as having had

disciplinary problems or having a job that might compete with school responsibilities. Age and gender did not relate significantly either to absenteeism or to dropping out.

Being a minority was associated with a significantly higher likelihood of receiving a failing grade (6 percentage points; $p<.05$) and of dropping out (3 percentage points; $p<.05$). Similarly, several measures of socioeconomic status were found to be significantly related to absenteeism and course failure, but no significant relationships were apparent to dropping out. Being from a low-income, urban, or single-parent household all were related to higher absenteeism, independent of other factors. For example, students from single-parent households were estimated to average 2 more days absent in a year than students from two-parent households ($p<.001$). This finding perhaps results from less parental oversight in single-parent households, particularly if the single parent was working outside the home and was not present to monitor student attendance. Being from a lower-income household also was significantly associated with a higher rate of course failure.

Previous academic difficulties resulting in students' having been held back one or more previous grades, as suggested by their being older than the typical age for their grade level, was consistently related to poorer student outcomes, but not significantly.

Extracurricular Activities

Student activities and behaviors demonstrated strong relationships to school performance and completion in the predicted directions. Students who belonged to school or community groups were estimated to have missed 3 fewer days in the school year than students without such affiliations ($p<.001$), to be 6 percentage points less likely to have failed a course ($p<.01$), and to be 4 percentage points less likely to have dropped out ($p<.01$), independent of other factors. The relationship between seeing friends often and both higher absenteeism and higher course failure ($p<.01$) suggests that spending more time with friends competes with time for school; students who saw friends outside of school 4 or 5 days a week were estimated to be absent a day more than students who saw friends once a week and were 4 percentage points more likely to have failed a course. Seeing friends frequently did not relate to dropping out when other factors were controlled.

Those who had had disciplinary problems were estimated to have missed almost 9 days more of school, on average, than students not having such problems ($p<.001$). They were estimated to be 9 percentage points more likely to have failed a course ($p<.05$) and 14 percentage points more likely to have dropped out ($p<.001$), independent of other factors in the analyses.

These findings lend support to the theory of social bonds as an underlying factor in school performance. Students who were abiding by school norms (i.e., were not having disciplinary problems) and who were affiliated with school or community groups were absent less often and were less likely to fail courses, other factors being equal. Conversely, for students whose friendship affiliations occurred frequently and largely

outside of school, competition between time spent with friends and school demands may explain their higher absenteeism and poorer grade performance.

Although a consistent pattern of positive relationships is noted between students having had a job and the outcome measures, the relationships are not statistically significant.

Combined Effects of Behavioral Factors on School Performance

The multivariate analysis results discussed thus far consider the independent effects of a variety of factors on student outcomes separately. However, this is only part of the story regarding the relationship of student characteristics and behaviors to student outcomes. We have demonstrated the interrelationships of the measures of school performance and school completion in Table 7. One implication of this chain of relationships is that factors that are related to one measure are, through that measure, indirectly related to outcomes that occur later in the hypothesized causal sequence. Figure 5 illustrates this notion of direct and indirect effects.

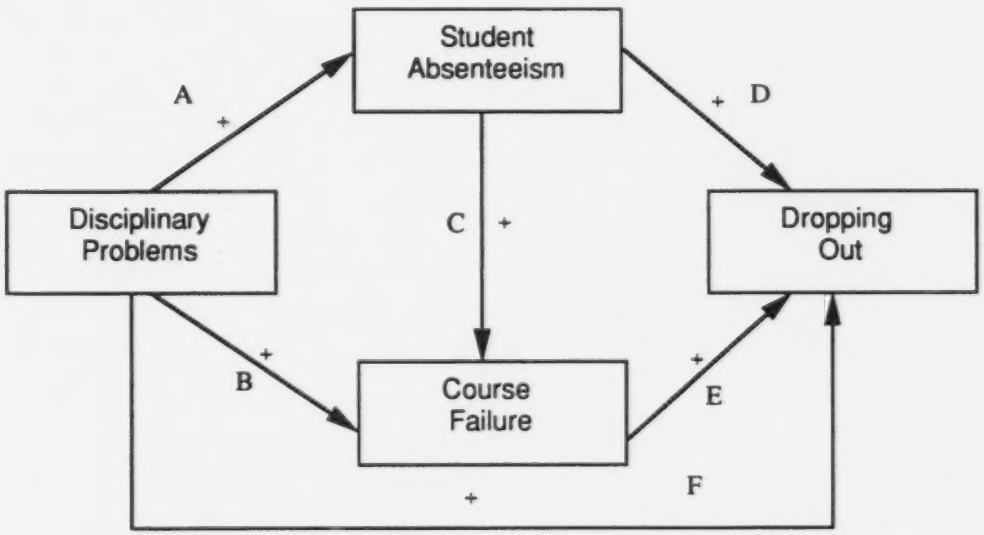

FIGURE 5 DIRECT AND INDIRECT RELATIONSHIPS BETWEEN STUDENT CHARACTERISTICS AND OUTCOMES

In this illustration, a behavioral factor, such as having had disciplinary problems, is shown to contribute directly to higher absenteeism and to a higher likelihood of course failure, indicated by the plus signs on arrows A and B. However, the relationship between absenteeism and course failure (arrow C) offers a second, indirect path through which having had disciplinary problems relates to course failure, by increasing absenteeism. Therefore, the full magnitude of the relationship between disciplinary problems and course failure is the combination of both the direct relationship and the indirect relationship (paths B and A/C). Similarly, the total magnitude of the relationship of having had disciplinary problems to dropping out includes both the direct (path F) and indirect relationships (paths A/D, B/E, and A/C/E).

To illustrate further, let us consider two hypothetical groups of students with characteristics that may put them at risk of dropping out. Let us suppose that both groups consist of male, 17-year-old students with learning disabilities from low-income households in urban areas. Let us assume that both groups had the distribution of IQ and functional skill levels typical of youth in their disability category and both groups had the same percentage of students who were older than their peers because they had repeated an earlier grade. Let us further assume that students in the first group had had disciplinary problems that had not been evidenced by students in the second group. The NLTS statistical analysis of absenteeism indicates that students with this combination of risk characteristics who had had disciplinary problems would average 26 days absent from school, compared with 18 days for students who had not had such difficulties (the magnitude of influence of arrow A from Figure 5).

The analysis further suggests that the direct effects of having had disciplinary problems alone would make the troublesome students 9 percentage points more likely to fail a course than the group of students who had not gotten into trouble (the magnitude of influence of arrow B, Figure 5). However, if we consider the higher absenteeism of students with disciplinary problems as well as the direct effects of that factor (the combination of arrow B and path A/C), the difference in the probability of course failure increases from 9 percentage points to 20 percentage points.

By the end of the year, we would estimate that the students with disciplinary problems would be 10 percentage points more likely than their peers to drop out if other things were equal (the magnitude of influence of arrow F). But higher absenteeism and poorer course grades make other things unequal. The combined effects of having disciplinary problems, poor attendance, and poor grades (the combination of arrows F, A/D, B/E, and A/C/E) increases the chances of dropping out to 54% for students with disciplinary problems, compared with 17% for others, a difference of 37 percentage points.

This example has illustrated the cumulative effects of factors that relate to more than one indicator of school performance. Beyond examining these cumulative effects of a single factor, we also recognize that the factors we have examined as independent

variables often do not occur independently, but cluster together. Students who experienced disciplinary problems also were less likely to have been affiliated with school or community groups and were more likely to have spent considerable time seeing friends outside of school (Newman, 1991a). This constellation of behavioral factors is even more powerfully related to school performance than is suggested by examining any one of the factors alone.

For example, returning to the students with learning disabilities used in the example above, if the students who had had disciplinary problems also did not belong to any groups and spent time seeing friends outside of school virtually every day, we would estimate that they would miss 28 days of school, compared with 15 days for similar students who affiliated with groups at school, saw friends only two or three days a week outside of school, and did not experience disciplinary problems. The combined direct effects on the likelihood of failing a course of these several behaviors taken together, and their combined indirect effects through increased absenteeism would make the probability of course failure 79% for the "problem" students, compared with 37% for the others. With higher absenteeism and a higher probability of course failure, the students who had disciplinary problems and exhibited poor social bonds with school would have had a 48% chance of dropping out, compared with 14% for their peers.

The strong relationships noted for various aspects of student activities and behaviors suggest several leverage points for those interested in improving students' school performance and the likelihood of school completion. Students who bonded with school, whose friendships did not overly compete with the time needed to meet school responsibilities, and who abided by social rules sufficiently to avoid disciplinary problems were less likely to fail academically and were more likely to persist in school. Abiding by social norms and allocating appropriate time to school work are examples of learned behaviors. Schools can encourage such behaviors by setting clear expectations for them, by providing opportunities for students with widely varying interests to find social memberships, and by working with parents to set guidelines for appropriate out-of-school social activities.

Such actions focus on the social realm of schooling. Relationships of student outcomes to more explicitly educational or instructional factors are considered in the next section.

5 SCHOOL PROGRAMS CAN MAKE A DIFFERENCE

The findings presented thus far mirror the thrust of the majority of research related to student performance and school completion, which has focused on student correlates of student performance. Demographic characteristics of students and socioeconomic characteristics of their families frequently have been associated with a variety of measures of school performance and school completion, as noted in the preceding section. When researchers have branched out from these demographic and socioeconomic characteristics, it is generally to measures of student attitudes toward schooling or, as the NLTS has done, to measures of student behaviors, such as delinquency and school absenteeism (e.g., Barro, 1984; Weber and Mertens, 1987). Surprisingly little research has focused on the relationships between individual students' school programs and their performance. When school program factors are included, they rarely compete well with individual characteristics in explaining variation in performance.

The preoccupation with individual correlates of student outcomes both underlies and reinforces the assumption that when poor student performance and high dropout rates occur, one should look to the student for their causes. Unfortunately, the student characteristics identified as strongly associated with poor performance often are not subject to influence by the education system. If conventional wisdom asserts that poverty, ethnicity, and family dysfunction are the causes of poor performance and early school leaving, educators may justifiably feel frustration and despair when confronting classrooms of poor, inner-city, minority students from troubled families. What is the school to do when there are three strikes against the student already? Some educators, policymakers, and researchers have concluded that schools can do little. This conclusion was exemplified in a 1987 statement by the then Assistant Secretary of Education, speaking about the dropout problem:

> The symptom is not likely to be eradicated by school-based remedies. Insofar as it [dropping out] is a manifestation of linked social pathologies and inherited characteristics, it is more like going on welfare or committing a crime than like the commonplace problems of school effectiveness that are susceptible to alteration within the framework of education policy and practice. (Finn, 1987)

Firestone and Rosenblum (1988) have found that this "blaming" of student background for poor student performance permeates the "teacher culture" in many schools, as characterized in the following statement by a secondary school teacher:

> They [students] don't care.... They have no family, no foundation. They have no incentives. The white kids don't want to go to school. They say, "My Dad's making more money than you working in the mill."...The black kids come from broken homes with a mother and no daddy.

To combat the powerlessness inherent in these remarks, educators need to know that the school programs they provide students can influence student performance and help students

stay in school. Once they are convinced that their efforts matter, they need to know what works in enabling students to perform to the extent they are able.

Unfortunately, there is no single answer to the question "what works?" because of the tremendous and growing diversity of students attending schools today. Cultural and language diversity in the classroom, for example, means that no single mode of teacher–student relating and no single pedagogical style is likely to be effective for all children in that classroom. Among students with disabilities, too, the great variation in their abilities and disabilities underscores the critical importance of the individualized programs that are one of the hallmarks of special education, as required by law.

Although recognizing that no particular program or service will be "the answer" for all students at risk of poor school performance, the NLTS research team nonetheless has begun the search for school factors that data suggest relate to better school performance and a lower probability of dropping out. Figure 6 directs our attention to two categories of school factors: those pertaining to the school, such as its size, policies, or practices, as depicted in Box B; and those characterizing individual students' school programs, such as courses taken and placement, as depicted in Box C. The specific factors we have examined, their hypothesized relationship to school performance, and related findings are presented below. This section concludes with findings from a multivariate analysis identifying the independent relationships of each factor to school performance and school completion, holding constant other school factors and the youth demographics, household and community characteristics, and extracurricular activities discussed in Section 3.

School Characteristics and Policies

Box B in Figure 6 illustrates the hypothesis that the school context sets a climate for student outcomes and influences those outcomes. Table 8 presents data regarding the following aspects of the school context and their relationships to school performance and completion*:

- ***Student enrollment.*** Recent research on the relationship of social bonding to better attendance suggests that students in smaller schools can more readily establish social bonds that support commitment to school and to good school performance than can students in larger schools (Gump, 1978; Grabe, 1981; Wehlage, 1983; U.S. General Accounting Office, 1987; Pittman and Haughwout, 1987; Wehlage, Rutter, Smith, Lesko, and Fernandez, 1989). Table 8 shows that students who attended schools with fewer than 500 students were significantly less likely to drop out than those in schools with between 500 and 1,100 students (6% vs. 10%; $p<.05$), the size range that encompasses the average school attended by youth with disabilities. This relationship was not significant in multivariate analysis, however, as discussed in the following section. But multivariate analyses do demonstrate that students attending larger schools were significantly more likely to have failed a course.

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* See Appendix B for definitions of all variables discussed in this section.

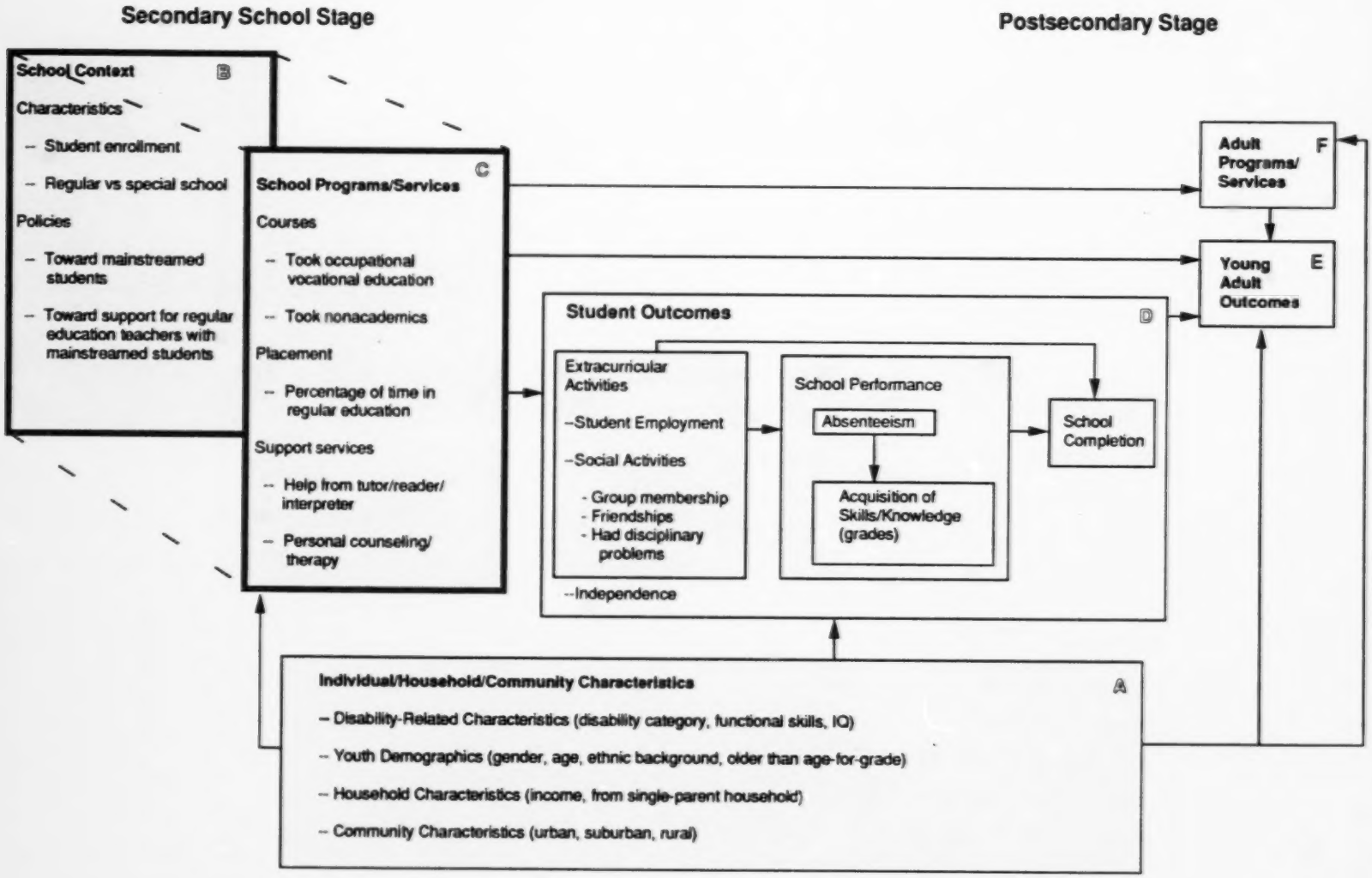

FIGURE 6 THE RELATIONSHIP OF SCHOOL FACTORS TO STUDENT OUTCOMES

Table 8

VARIATIONS IN SCHOOL PERFORMANCE AND SCHOOL COMPLETION BY SCHOOL CONTEXT FACTORS

School Characteristics/Policies	Number of Days Absent			Students Failing One or More Courses			Students Who Dropped Out		
	Mean	S.E.	N	Percent	S.E.	N	Percent	S.E.	N
School characteristics									
Student enrollment									
500 students or fewer	13.8	.9	1,947	28.0	3.4	535	5.6	1.2	2,497
501 to 1,100 students	15.7	.8	1,367	34.0	2.5	1,440	9.7	1.4	1,750
> 1,100 students	14.5	.9	1,555	32.8	2.9	1,807	9.0	1.5	2,392
Attended special school									
Yes	16.3	1.4	1,492	10.7	2.3	1,592	7.0	1.8	1,932
No	14.8	.5	3,702	33.1	1.6	4,112	9.6	.9	5,406
School policies									
School reported expecting mainstreamed students to keep up in regular classes without help									
Yes	13.6	1.3	577	33.6	3.1	1,164	8.9	1.7	1,441
No	13.8	.8	1,687	31.4	2.1	2,133	8.6	1.1	2,664
School reported offering the following support to regular teachers with mainstreamed students									
Special materials for students									
Yes	13.8	.9	999	31.9	2.3	1,944	8.8	1.3	2,417
No	13.8	1.0	1,268	32.9	2.6	1,346	8.4	1.4	1,687
Inservice training on mainstreaming									
Yes	13.8	1.1	800	38.0	2.8	1,499	8.1	1.4	1,917
No	13.8	.9	1,467	28.9	2.2	1,791	9.0	1.3	2,187
Classroom aides									
Yes	13.7	1.4	654	37.3	3.3	1,283	7.5	1.6	1,584
No	13.8	.8	1,613	30.4	2.0	2,007	9.1	1.2	2,520
Smaller class size									
Yes	10.7	1.5	212	29.7	4.7	444	10.3	2.9	541
No	14.1	.7	2,055	32.7	1.9	2,846	8.4	1.0	3,563

Source: NLTS Survey of Secondary Special Education Programs and students' school records for their most recent school year.

- ***Attending a special school.*** We have included in these analyses a dichotomous variable indicating whether the student attended a special school, to stand as a proxy for the variety of differences between regular and special schools that could influence school performance. Special schools often have more specialized staff and tailored programs to address the particular learning needs of their students, which could lead to better school performance for special school students. However, attending a special school is confounded with student characteristics. For example, for youth in some disability categories, those in special schools were generally more severely impaired (Wagner, 1991b; Allen, Rawlings, and Schildroth, 1989); for other categories, special schools often

attracted students who already were having trouble succeeding in regular schools and exhibited factors associated with lower performance.

Only receipt of failing grades was related to school type in Table 8, with special school students who received grades being significantly less likely to fail a course (11% vs. 33%; $p<.001$) than regular school students. No significant bivariate relationship was revealed between attending a special school and either student absenteeism or the probability of dropping out. Multivariate analyses, which control for the confounding effects mentioned above, reveal no significant difference between regular and special school students on any of the school performance measures analyzed by the NLTS. Special schools did not appear to be "the answer" for youth with disabilities who were experiencing poor school performance.

- ***Whether mainstreamed students were expected to keep up in regular education classes without help.*** Although the NLTS does not measure directly the presence of a caring attitude on the part of school staff, a factor found to be related to better school performance (Wehlage, 1983), we have measured the extent to which schools reported that mainstreamed students generally were expected to keep up in regular education classes without help. (NLTS data indicate that more than one-third of regular school students with disabilities attended schools with this "sink or swim" policy; Wagner, 1991c.) Such a policy may proxy for the absence of a caring attitude; conversely, schools without such a policy may exhibit a more caring attitude. We expect students who attended schools with a policy that mainstreamed students should keep up without help to have poorer school outcomes than students who attended schools that recognized that mainstreamed students may need help to succeed. Although a pattern of lower absenteeism, course failure, and dropping out is noted, the relationships are small and not statistically significant. The apparent weakness of the relationships to school performance of this and other school policies may result in part from the inadequacy of their measurement rather than or in addition to their lack of real influence on students. If the NLTS had been able to measure actual instructional behaviors, rather than simply the reported presence of a policy in a school, the magnitude of the relationships might have been larger.

- ***Whether regular education teachers with mainstreamed students were given support.*** Various forms of support to regular education teachers of mainstreamed special education students (e.g., smaller class size, special materials) were intended to help them better respond to the individual learning needs of their students. To the extent they were successful in doing so, we would expect that student performance would be higher for students attending schools that reported routinely providing teachers with such support. No systematic relationships were revealed in Table 8 between most forms of support and most student outcomes. However, we do find, as expected, that students in schools reporting that regular education teachers had smaller classes if they contained mainstreamed students were absent significantly less than students who attended schools without that support for teachers (11 days vs. 14 days; $p<.05$).

  A second relationship between teacher support and student outcomes is contrary to expectations. Students attending schools that reported routinely providing regular education teachers with inservice training on mainstreaming were significantly more likely to have failed a course (38% vs. 29%; $p<.05$). It is unlikely that the training provided teachers actually had a detrimental effect on grades earned by or given to students in special education. It is more likely to be

something about the schools in which inservice training on mainstreaming was provided that affected receipt of failing grades. For example, one potential explanation is that inservice training was being provided in schools with regular education teachers who were reluctant to receive mainstreamed students or who needed help to adapt their instructional approaches to accommodate the needs of those students. In such an environment, students in special education may have been doing less well than in schools in which regular education teachers accommodated mainstreamed students more readily or more effectively, making inservice training on the issue unnecessary.

Students' School Programs

The school factors illustrated in Box B of Figure 6 and discussed above are characteristics of the schools themselves and, therefore, are not individualized for each student. However, factors included in Box C characterize the educational programs of particular students. As such, we expect to see stronger relationships between these individual student program characteristics and students' school performance. Table 9 presents the bivariate relationships between student outcomes and characteristics of students' school programs.

- ***Enrollment in occupationally oriented vocational education***. The social-bonding literature suggests that programs relevant to students' interests have greater "holding power" over students. Relevance of school programs is difficult to measure because what is considered relevant varies among students. However, we have assumed that for many students with disabilities, a vocational program may be perceived as more relevant than a traditional academic program in light of the fact that a much greater proportion of students with disabilities transition directly into the job market, rather than to college, when they leave secondary school (Butler-Nalin and Wagner, 1991). Further, an explicit objective of vocational education is "motivating students to remain in school" (Catterall and Stern, 1986; Weber and Mertens, 1987). Table 9 provides an indication that it may have had the intended effect for students with disabilities. Although no significant bivariate relationships to absenteeism or course failure are noted in Table 9, we do find that students who took occupational training in their most recent school year were significantly less likely to have dropped out of school (8% vs. 12%; $p<.05$). In multivariate analyses, occupational vocational training was significantly related both to lower absenteeism and a lower probability of dropping out.

- ***Enrollment in nonacademic courses***. Other NLTS analyses have demonstrated that students' course grades were higher for nonacademic classes than for academic classes (Wagner, 1991a). To the extent that such a relationship applies to school outcomes more broadly, we would expect to see better outcomes among students who took nonacademic courses than among those who did not. However, Table 9 demonstrates no such relationship, perhaps because of its limited variability (90% of students attending regular schools took such courses).

Table 9

VARIATIONS IN SCHOOL PERFORMANCE AND SCHOOL COMPLETION BY CHARACTERISTICS OF STUDENTS' SCHOOL PROGRAMS

Students' School Program	Number of Days Absent			Students Failing One or More Courses			Students Who Dropped Out		
	Mean	S.E.	N	Percent	S.E.	N	Percent	S.E.	N
Student took in the most recent year:									
Occupationally oriented vocational education									
Yes	14.9	.6	2,962	33.7	2.0	2,334	8.3	1.1	3,458
No	15.0	.8	2,186	32.5	2.5	1,744	12.0	1.2	4,181
Nonacademic courses									
Yes	14.0	.7	2,325	35.4	2.2	2,536	8.8	1.1	2,826
No	14.5	2.2	288	28.7	6.2	321	9.8	2.8	504
Student received in the most recent year from the school:									
Help from a tutor/reader/ interpreter									
Yes	13.7	1.2	1,083	28.9	3.9	1,171	4.3	1.5	592
No	14.9	.6	3,192	31.7	1.8	3,500	11.1	.9	6,583
Personal counseling/therapy									
Yes	16.5	1.2	1,064	32.8	3.5	1,152	6.1	2.2	592
No	14.2	.6	3,208	30.8	1.8	3,516	9.0	1.0	3,453
Percentage of time in regular education courses									
0%	15.8	2.2	654	14.3	3.1	653	8.8	1.7	2,041
1% to 33%	17.9	2.0	431	31.2	3.5	735	9.3	2.2	794
34% to 66%	13.2	1.3	442	33.8	3.5	701	11.2	2.3	742
67% to 99%	12.5	1.1	530	40.8	3.1	1,050	8.8	2.0	1,073
100%	12.4	1.1	555	34.8	3.8	945	7.4	2.0	1,064
Number of courses for which grades given									
1 or 2	NA	NA	NA	19.7	8.8	101	NA	NA	NA
3 or 4	NA	NA	NA	22.7	4.6	430	NA	NA	NA
5	NA	NA	NA	30.0	4.0	369	NA	NA	NA
6	NA	NA	NA	34.8	3.2	1,100	NA	NA	NA
7	NA	NA	NA	39.2	3.5	1,022	NA	NA	NA
8 or more	NA	NA	NA	40.1	3.3	1,406	NA	NA	NA

Source: Days absent from school, number of graded courses, enrollment in vocational education, and percentage of time in regular education are from students' school records. Receipt of tutoring assistance and counseling is based on parent interviews or school records; see Appendix C.

- ***Percentage of instructional time in regular education.*** Recent literature has determined that one characteristic of effective programs is their individualization. Although the NLTS does not measure this factor directly, it often is more characteristic of special education programs than of regular education classes. To the extent that this factor characterizes special education and is effective in improving school performance, we hypothesize that students with more time in special education and, therefore, a lower proportion of instructional time in regular

education, would have better outcomes. Further, grading standards in regular education courses often are more stringent. Students with more time in regular education would be expected to fail courses more often because the demands of regular coursework make it more difficult for them to achieve. Table 9 demonstrates that students with no time in regular education were significantly less likely to fail courses than other students (14% vs. 31% or more); this latter relationship of time spent in regular education and the likelihood of receiving a failing grade is confirmed in multivariate analysis. No significant relationship was found between the percentage of time students spent in regular education and their probability of dropping out of school.

- ***Number of courses for which grades were received***. Mathematically, a student's chances of receiving a failing grade increase when more graded courses are taken, apart from the nature or placement of such courses. We have considered this factor only in relationship to receipt of failing grades, and find the expectation confirmed in Table 9.

- ***Receipt of support services***. Individualized attention from a tutor, reader, or interpreter and personal counseling are two forms of support for students that may be effective in ameliorating poor student outcomes. The one-to-one relationship between a student and a tutor, reader, or interpreter, as well as counseling, may be effective in communicating to students that someone cares about their educational performance and believes that they can achieve, factors found to be effective in improving school performance for youth at risk of school failure (Wehlage et al., 1989). For these reasons, counseling was provided by 94% of dropout prevention programs studied by the U.S. General Accounting Office (1987). Table 9 demonstrates a significantly lower dropout rate for students who received help from a tutor, reader, or interpreter compared with those who did not (4% vs. 11%; $p<.001$). The dropout rate for students who received counseling was not significantly lower than the rate for students who did not in bivariate analysis, but the difference does attain statistical significance in the multivariate analysis presented below.

Although few significant relationships are apparent in Tables 8 and 9, research has demonstrated that the nature of students' school programs and the nature of their abilities and disabilities are strongly related (Wagner, 1991b). For example, students who took occupational training (rather than a strictly academic program) perhaps were less likely to be college bound. Such students might have demonstrated poorer performance than college-track students, irrespective of their vocational training. Multivariate analyses are needed to identify the independent effects of school factors when student characteristics are controlled for in the analyses.

Multivariate Analyses of School Factors Related to School Performance and School Completion

Overall, we find that adding measures of school context and students' school programs to analyses of student outcomes adds little to the explanatory power of the analyses beyond the disability, individual, household, community, and behavioral characteristics already discussed. For example, an analysis of absenteeism including only the student characteristics discussed earlier yielded an r^2 of .12, which increased only to .13 when school factors were added.

Individual factors powerfully condition students' outcomes. Yet, if we go beyond this perspective of relative influence, we find that several specific school factors were significantly related to various outcomes in multivariate analyses, as summarized in Table 10 (all student variables discussed previously also were included in this analysis). The strength of their combined relationships to outcomes is even more potent.

Table 10

ESTIMATED CHANGE IN SCHOOL PERFORMANCE AND PROBABILITY OF NOT COMPLETING SCHOOL ASSOCIATED WITH SCHOOL CHARACTERISTICS AND PROGRAMS

School Factors	Estimated Change in: Average Number of Days Absent	Rate of Course Failure (Percentage Points)	Rate of Dropping Out (Percentage Points)	For Increment
School characteristics				
Student enrollment	-.5	1.8*	-.5	1,300 vs. 700 students
Attended special school	-.6	-.9	1.2	Yes vs. no
School policies				
Mainstreamed students expected to keep up in regular education classes without help	.8	2.3	.7	Yes vs. no
School reported providing to regular education teachers with mainstreamed students:				
Special materials for students	.1	-1.4	-.9	Yes vs. no
Inservice training	-.3	4.8*	.8	Yes vs. no
Classroom aides	.3	.6	-.4	Yes vs. no
Smaller classes	-.1	-.1	2.2	Yes vs. no
Students' school programs				
Student took in the most recent year:				
Occupationally oriented vocational education	-1.5*	-3.0	-2.6*	Yes vs. no
Nonacademic courses	-.3	-.4	-1.4	Yes vs. no
Percentage of time in regular education classes	-.3	7.9***	.4	6 vs. 3 classes
Number of courses in which grades given	NA	7.2***	NA	6 vs. 4 classes
Student received in the past year from the school:				
Help from a tutor/reader/interpreter	-.6	-.2	-3.2*	Yes vs. no
Personal counseling/therapy	2.2***	2.4	-3.2**	Yes vs. no

* $p < .05$.
** $p < .01$.
*** $p < .001$.

School Characteristics

- ***Student enrollment***. Students attending larger schools had a significantly higher probability of course failure than students in smaller schools ($p<.05$), although the increase in the likelihood of failure was only 2 percentage points. This finding is consistent with social-bonding theory, suggesting that larger schools may present a more difficult environment for students to find support when difficulties with school performance or other aspects of their lives occur.

School Policies

- ***Support for teachers with mainstreamed students***. An unexpected finding is that students attending schools that reported providing inservice training on mainstreaming to regular education teachers with mainstreamed students were significantly more likely than other students to have received a failing grade (almost 5 percentage points; $p<.05$). Again, a possible explanation for this finding is that such support was provided more frequently in schools in which mainstreaming was fairly new or was problematic, an environment that may have affected the outcomes or treatment of special education students in such schools.

Students' School Programs

- ***Participation in occupationally oriented vocational education***. When student factors were controlled, taking occupationally oriented vocational education was significantly related to better school outcomes on two measures. Students who took such training were estimated to miss 1 less day of school and to be 3 percentage points less likely to drop out.

  These findings suggest that occupational training not only may provide students with skills to prepare them for later employment, but may improve their performance while they are still in school. An alternative explanation can be inferred from the work of Thornton and Zigmond (1987), who suggest that, because vocational education is more common among students in higher grades, youth who are "at risk" drop out before becoming involved in vocational courses. The more successful students remaining to enroll in vocational education account for its apparent positive effects. However, our analysis controlled for student age as well as several factors associated with being at risk of course failure (e.g., high absenteeism, repeating earlier grades, having disciplinary problems), and found that positive relationships between vocational training and better performance persisted.

- ***Percentage of time in regular education classes***. Students who spent a greater percentage of their time in regular education classes and in classes for which grades were given were significantly more likely to have failed a course in their most recent school year. For example, we estimate that students who were mainstreamed for 6 classes would be almost 8 percentage points more likely to receive a failing grade than similar students who were mainstreamed for 3 courses ($p<.001$). Being graded in more courses has a similar magnitude of relationship, independent of other factors. Students who were mainstreamed for more courses received grades in more courses, reinforcing the conclusion that students with disabilities whose school programs came closest to approximating those of their nondisabled peers (e.g., in regular education classes for which grades were given), were significantly more likely than other students to receive a

failing grade, independent of their IQ, functional abilities, and other factors included in the analysis. Because poor performance in regular education classes was often the impetus for the original referral of many students to special education, it is not surprising that some special education students continued to find it difficult to succeed academically in the regular education environment. No significant independent relationship was found between the percentage of time students spent in regular education and their probability of dropping out of school.

- ***Receiving support services***. Somewhat inconsistent findings are apparent regarding receipt of personal counseling. Students who received counseling were estimated to have missed 2 more days of school ($p<.001$), but to be 3 percentage points less likely to have dropped out ($p<.01$). A possible explanation for the first finding is that students received counseling at least in part because higher absenteeism suggested they were at risk of poor outcomes. When levels of absenteeism were held constant, however, receipt of counseling had the expected relationship to a lower probability of dropping out. Help from a tutor, reader, or interpreter also demonstrates the desired relationship to school outcomes; those receiving help from a tutor, reader, or interpreter were estimated to be 3 percentage points less likely to drop out than nonrecipients.

No consistent or significant relationships were found regarding special school enrollment or taking nonacademic classes when other aspects of students and their programs were controlled for in the analyses. Although there was a consistent relationship between attending a school with a policy that mainstreamed students were expected to keep up in regular education classes without help and poorer performance on all three measures, the relationships did not attain statistical significance.

Combined Effects of School Factors on Student Outcomes

Throughout this analysis, we have seen that student characteristics and student behaviors had relatively stronger relationships to measures of student performance than did characteristics of students' schools or educational programs. Some school factors had significant relationships to some measures of student performance, but the findings regarding school effects were not always consistent, nor were the relationships generally strong. However, focusing on the relationships of individual school factors to single measures of student performance understates the potential impact of school factors in combination on measures of student performance in combination.

To illustrate this point, we take again the example of white male students classified as learning disabled that was used in Section 4. Let us assume that all students had the behavioral characteristics that were average for students in their disability category. Variations in school factors can combine to paint very different pictures of these students' prospects for succeeding in secondary school. Let us imagine that some students attended schools in which mainstreamed students were expected to keep up in their regular education classes without help. Six of their seven classes were regular education courses, and they received grades in all courses. Their schedules did not include occupationally oriented vocational classes or nonacademic classes. They did not receive tutoring assistance from the school to help with

school work, nor did their regular education teachers receive special materials to use in their instruction.

In such a scenario, we would estimate that these students would be absent more than 18 days in the school year. With the kind of program they had and this level of absenteeism, we estimate that they would have almost a 2 in 3 chance (65%) of failing a course. With this high probability of course failure and relatively high absenteeism, the likelihood of their dropping out would be 28%.

In contrast, suppose their learning disabled peers attended schools that recognized that mainstreamed students may need additional help to keep up in their regular education classes. In this vein, the school offered regular education teachers who had mainstreamed students special materials for those students. These students were mainstreamed for five of their seven classes and received grades for six of their courses. They were enrolled in occupationally oriented vocational education, and each took one nonacademic course. Their schools provided peer tutors to help them with school work.

These learning disabled students would be estimated to miss 16, rather than 18, days of school. With this slightly lower absenteeism and more supportive school and school program, the likelihood of their failing a course would be markedly lower than for their peers, 42% compared with 65%. Although these students clearly were still struggling academically, their lower absenteeism and lower probability of course failure combined with their program and school characteristics to yield a probability of dropping out of 3%, compared with 28% for the students described previously.

Clearly, no one combination of school characteristics or school programs is "the answer" for any particular student or group of students. However, these scenarios suggest that, although poor school performance and early school leaving are complex problems that often are compounded through several school years, differences in school policies and school programs can affect the chances for students with disabilities to succeed in school.

6 SUMMARY

NLTS data have demonstrated that only about half of students with disabilities who leave secondary school do so by graduating; almost one-third of school leavers with disabilities are dropouts. These figures indicate a markedly lower rate of school completion than for youth as a whole, about three-fourths of whom graduate from high school. Clearly, for special education students, achieving the national goal of a 90% graduation rate by the year 2000 requires a markedly greater improvement in school completion than is required for typical students.

The fairly pervasive problem of early school leaving among students with disabilities has its precursors in poor school performance. Students with disabilities were absent from school, on average, three full weeks in their most recent school year. More than a third of students had failed at least one course during that year. Those with high absenteeism and course failure had the greatest propensity to drop out.

Faced with this fairly bleak picture of school performance and school completion among students with disabilities, some educators may despair of improving the situation. NLTS data suggest that despair is not warranted. Although high absenteeism and course failure are important contributors to dropping out, the majority of students who missed school and failed courses persisted in school. As long as they are at school, they are amenable to positive influence by educators who make the effort to help.

Does anything help? Fortunately, data suggest that there are leverage points available to schools that may help them to help their students stay in school. High absenteeism and poor grade performance should be thought of as red flags of warning that can help schools target support programs and dropout prevention activities to students most in need. They may indicate students who have not developed social bonds with their schools, who are not well engaged in the educational process, and who find schools to be environments for failure. Interventions early in students school careers that help them to identify with school, both socially and academically, may break the process of disengagement from school that can end in students dropping out. Specific aspects of secondary school programs, such as occupationally oriented vocational education, may help some students find a school setting in which they can succeed. The specific interventions a given school attempts must reflect the particular characteristics of that school and its student body. To be successful, they also must reflect an understanding of the wide variation in school experiences and school performance demonstrated by their students with disabilities.

A goal of improving the school performance and school completion of students with disabilities seems valuable in itself. The potential benefits from such an improvement are even more apparent, however, if we shift our focus from secondary school to the early postschool years. NLTS research has demonstrated that students with disabilities who graduated from high school were on an upward trajectory into their postschool transition compared with youth

who dropped out. For example, graduates who were out of secondary school up to 2 years were estimated to be 17 percentage points more likely to have found competitive employment than were dropouts with similar individual, household, and community characteristics (D'Amico, 1991). Similarly, graduates were estimated to be 14 percentage points more likely than dropouts to have enrolled in a postsecondary school (Butler-Nalin and Wagner, 1991) and were 27 percentage points more likely to have become engaged in work- or education-related activities outside the home after high school (Jay, 1991). Conversely, dropouts were disproportionately represented among those who had been arrested; 27% of those who had been arrested were dropouts, compared with 7% of those never arrested (Newman, 1991a).

NLTS data suggest that the seeds of a successful postschool transition for young people with disabilities are sown in secondary school. Improvements in transition outcomes can begin with improvements in secondary school performance and school completion. NLTS findings suggest that if schools can give students powerful reasons to come to school and can help students achieve in their courses, they can help many students persist in school. This should be heartening to educators who serve students with disabilities. They can influence their students' probabilities of school completion by performing effectively their primary educational mission. If they can engage their students in school and help their students to perform up to their ability and to school expectations, they will have gone far toward ameliorating the propensity toward early school leaving, and will have improved students' prospects for success in their adult years.

Appendix A

OVERVIEW OF THE NATIONAL LONGITUDINAL TRANSITION STUDY OF SPECIAL EDUCATION STUDENTS

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As part of the 1983 amendments to the Education of All Handicapped Children Act (EHA), the Congress requested that the U.S. Department of Education conduct a national longitudinal study of the transition of secondary special education students to determine how they fare in terms of education, employment, and independent living. A 5-year study was mandated, which was to include youth from ages 13 to 21 who were in special education at the time they were selected and who represented all 11 federal disability categories.

In 1984, the Office of Special Education Programs (OSEP) of the U.S. Department of Education contracted with SRI International to determine a design, develop and field test data collection instruments, and select a study sample. In April 1987, under a separate contract to OSEP, with supplemental funding from the Rehabilitation Services Administration, SRI began the National Longitudinal Transition Study of Special Education Students (NLTS).

In the field of research on youth with disabilities, the NLTS is unique in several respects. For many years, the research base on youth with disabilities has consisted largely of studies of relatively few youth who were in particular disability categories, in a few school districts or a single state, or in a specific educational placement or treatment program. It has been very difficult to paint a broad picture of students from this fragmented research base. With the NLTS, findings are based on a large and nationally representative sample. The data presented here were collected in 1987 for a sample of more than 8,000 youth representing the national population of secondary special education students who were ages 13 to 21 in the 1985-86 school year. The sample permits us to estimate with fairly high precision many of the characteristics of youth with disabilities and their experiences in adolescence and early adulthood. Further, the sample is nationally representative of 1985-86 secondary special education students, both as a whole and for those in each of the 11 federal disability categories separately. (See Table A-1 for definitions of these categories.) Therefore, for the first time we know what the transition experiences were for youth with mental retardation, for example, and how they differed from those of youth with orthopedic impairments or multiple handicaps.

The NLTS is also unusual in its longitudinal design. The students for whom data were gathered in 1987 are being retained in the study, and follow-up data were collected about them in 1990. These follow-up data will enable the estimation of trends in experiences as youth age. For example, we will be able to describe the movement in and out of jobs and in and out of school that often characterizes youth in their early adult years.

Table A-1

FEDERAL DEFINITIONS OF SPECIAL EDUCATION DISABILITY CATEGORIES

Specific learning disability. A disorder in one or more of the basic psychological processes involved in understanding or using language, spoken or written, which may manifest itself in an imperfect ability to listen, think, speak, write, spell, or to do mathematical calculations; this includes perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia, but does not include learning problems resulting from visual, hearing, or motor handicaps, or from mental retardation.

Seriously emotionally disturbed. Exhibition of behavior disorders over a long period of time that adversely affect educational performance; this includes an inability to learn that cannot be explained by intellectual, sensory, or health factors; an inability to build or maintain satisfactory interpersonal relationships with peers and teachers; inappropriate types of behaviors or feelings under normal circumstances; a general pervasive mood of unhappiness or depression; or a tendency to develop physical symptoms or fears associated with personal or school problems.

Speech impaired. Communication disorders, such as stuttering, impaired articulation, language or voice impairments, that adversely affect educational performance.

Mentally retarded. Significantly subaverage general intellectual functioning with concurrent deficits in adaptive behavior that were manifested in the developmental period and that adversely affect educational performance.

Visually impaired. A visual impairment that, even with correction, adversely affects educational performance, including students who are partially sighted or completely blind.

Hard of hearing. A hearing impairment, permanent or fluctuating, that adversely affects educational performance but that is not included in the deaf category.

Deaf. A hearing impairment that is so severe that the child is impaired in processing linguistic information through hearing, with or without amplification, which adversely affects educational performance.

Orthopedically impaired. A severe orthopedic impairment that adversely affects educational performance, including those caused by congenital anomaly, disease, or other causes.

Other health impaired. Limited strength, vitality, or alertness due to chronic or acute health problems that adversely affect educational performance (includes autistic students).

Multiply handicapped. Concomitant impairments, the combination of which causes such severe educational problems that they cannot be accommodated in special education programs solely for one of the impairments (does not include deaf/blind).

Deaf/blind. Concomitant hearing and visual impairments, the combination of which causes such severe communication and other developmental and educational problems that they cannot be accommodated in special education programs solely for deaf or blind students.

Finally, the NLTS is extremely broad in scope, gathering information on a wide range of characteristics, experiences, and outcomes of youth with disabilities, including the following:

- Individual and family characteristics (e.g., demographics, disability-related characteristics).
- Independent functioning (e.g., residential independence, financial independence, functional abilities).
- Social experiences (e.g., belonging to school or community groups, socializing with friends).
- School programs (e.g., courses taken, support services provided, educational placements).
- School characteristics and policies (e.g., type of school attended, policies related to mainstreaming, programs available for special education students).
- School achievement and completion (e.g., grades received, absenteeism, dropout/graduation behaviors).
- Employment characteristics (e.g., rates of employment, job types and duration, wages).
- Postsecondary education participation in vocational schools and 2-year and 4-year colleges.
- Services provided by the school and other sources (e.g., job training, physical therapy, counseling).
- Parental expectations for youth in the areas of education, employment, and independence.

This breadth of scope provides the most comprehensive picture yet available of youth with disabilities during adolescence and early adulthood.

Study Components

The NLTS has four major components:

- *The parent/guardian survey.* In the summer and fall of 1987, parents were interviewed by telephone to determine information on family background and expectations for the youth in the sample, characteristics of the youth, experiences with special services, and the youths' educational attainments (including postsecondary education), employment experiences, and measures of social integration. Parents rather than youth were selected as respondents for the first wave of data collection because of the need for family background information and because, with most students still being in secondary school and living at home, parents were believed to be accurate respondents for the issues addressed. A follow-up survey was conducted in the fall of 1990, when youth were interviewed if they were able to respond.
- *School record abstracts.* Information has been abstracted from students' school records for their most recent year in secondary school (the 1985-86 or 1986-87 school year). This information relates to courses taken, grades achieved (if in a graded program), placement, related services received from the school, status at the end of the year, attendance, IQ, and experiences with minimum competency testing.

In spring 1991, secondary school transcripts will be sought for all youth who were in secondary school at any time since the 1986-87 school year.

- *Survey of secondary special education programs.* Schools attended by sample students in the 1986-87 school year were surveyed for information on enrollment, staffing, programs and related services offered to secondary special education students, policies affecting special education programs and students, and community resources for the disabled. A similar survey is being conducted in 1991 for youth still in secondary school in the 1990-91 school year.
- *Explanatory substudies.* Studies involving two subsamples of youth have looked in greater depth at (1) students' secondary school programs (the school program substudy), (2) the patterns of transition outcomes achieved by youth who were out of secondary school (the exiter substudy), and the relationship between school experiences and outcomes. Substudies were conducted in 1989 and 1990.

The NLTS Sample

The NLTS sample was constructed in two stages. A sample of 450 school districts was randomly selected from the universe of approximately 14,000 school districts serving secondary (grade 7 or above) special education students,* which had been stratified by region of the country, a measure of district wealth involving the proportion of students in poverty (Orshansky percentile), and student enrollment. Because not enough districts agreed to participate, a replacement sample of 178 additional districts was selected. More than 80 state-supported special schools serving secondary-age deaf, blind, and deaf blind students were also invited to participate in the study. A total of 303 school districts and 22 special schools agreed to have their students selected for the study.

Analysis of the potential bias of the district sample indicated no systematic bias that would have an impact on study results when participating districts were compared with nonparticipants on several characteristics of the students served, participation in Vocational Rehabilitation programs, the extent of school-based and community resources for the disabled, the configuration of other education agencies serving district students, and metropolitan status (see Javitz and Wagner, 1990, for more information on the district sample). Bias may exist, of course, on factors for which data were not available for such comparisons.

Students were selected from rosters compiled by districts, which were instructed to include all special education students in the 1985-86 school year who were in grades 7 through 12 or whose birthdays were in 1972 or before, whether they were served within the district or outside the district (e.g., in a state-supported residential school). Rosters were stratified into 3 age groups (13 to 15, 16 to 18, over 18) for each of the 11 federal disability categories, and youth

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* The 1983 Quality Education Data, Inc., (QED) database was used to construct the sampling frame. QED is a private nonprofit firm located in Denver, Colorado. Special education cooperatives and other special service units were not sampled directly (83% of special education students are served directly by school districts; Moore et al., 1988). However, instructions to districts for compiling student rosters asked districts to include on their listing any students sent from their district to such cooperatives or special service units. Despite these instructions, some districts may have underreported students served outside the district.

were randomly selected from each age/disability group so that approximately 800 to 1,000 students were selected in each disability category (with the exception of deaf blind, for which fewer than 100 students were served in the districts and schools included in the sample).

In part because of the time lapse between sample selection and data collection, many students could not be located at the addresses or telephone numbers provided by the schools. Of the 12,833 students selected for the sample, about one-third could not be reached by telephone for the parent interview. (For more than half of these, addresses and telephone numbers were not provided by the schools/districts from which they were sampled.) This relatively high rate of inability to reach sample members confirmed the importance of including in the NLTS a substudy of nonrespondents to determine whether those who were reached for the telephone interview were a representative sample of the population to which the study was intended to generalize. To identify whether bias existed in the interview sample, interviewers went to 28 school districts with relatively high nonresponse rates to locate and interview in person those who could not be reached by telephone. Of the 554 sought for in-person interviews, 442 were found and interviewed, a response rate of 80%. A comparison of telephone interview respondents with in-person interview respondents showed that the telephone sample underrepresented lower-income households. The sample was reweighted to adjust for that bias, as described in the next section.

Of the 10,369 sampled students for whom addresses or telephone numbers were provided by schools or districts, some portion of the needed data was collected for 84%; the response rates for individual components of the study were as follows:

	N	Response Rate
Parent interview	7,619	71%
School records	6,241	60
School survey	6,672	64

Weighting Procedures and the Population to Which Data Generalize

Youth with disabilities for whom data could be gathered were weighted to represent the U.S. population of special education students in the 1985-86 school year who were in grades 7 through 12 or at least 13 years old. Because it is a sample of students at various ages, the NLTS sample does not generalize to youth who had dropped out of school before that age. For example, the sample of 18-year-olds generalizes to youth who were 18 and still in secondary school in 1985-86, not to all 18-year-olds with disabilities, many of whom may have left school at an earlier age.

In performing sample weighting, three mutually exclusive groups of sample members were distinguished:

(A) Youth whose parents responded to the telephone interview.

(B) Youth whose parents did not respond to the telephone interview but were interviewed in person.

(C) Youth whose parents did not respond to either the telephone or in-person interview but for whom we obtained a record abstract.

A major concern in weighting was to determine whether there was a nonresponse bias and to calculate the weights in such a way as to minimize that bias. There was a potential for three types of nonresponse bias*:

(1) Bias attributable to the inability to locate respondents because they had moved or had nonworking telephone numbers.

(2) Bias attributable to refusal to complete an interview (only 3% of those available to be interviewed refused).

(3) Bias attributable to circumstances that made it infeasible to locate or process a student's record.

Of these three types of nonresponse, the first was believed to be the most important, in terms of both frequency and influence on the analysis. Type 1 bias was also the only type of nonresponse that could be estimated and corrected for.

The magnitude of type 1 nonresponse bias was estimated by comparing responses to items available for the three groups of respondents (after adjusting for differences in the frequency with which youth in different disability categories were selected and differences in the size of the districts selected). Group A was wealthier, more highly educated, and less likely to be minority than group B. In addition, group A was more likely to have students who graduated from high school than group B or C (which had similar dropout rates). Groups A and B were compared on several additional measures for which data were unavailable for group C. The youth described by the two groups were similar on these additional items, including gender, employment status, pay, functional skills, association with a social group, and length of time since leaving school. Adjusting the weights to eliminate bias in the income distribution eliminated bias in parental educational attainment and ethnic composition, but did not affect differences in dropout rates. It was also determined that groups B and C were large enough that if they were treated the same as group A in the weighting process, the resulting dropout distribution would be approximately correct.

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* We assumed that nonrespondents who could not be located because districts did not provide student names would have chosen to participate at about the same rate as parents in districts in which youth could be identified. The remaining nonrespondents would presumably have been distributed between the three types of nonresponse mentioned above.

Weighting was accomplished using the following steps:

- Data from the first two groups of sample members were used to estimate the income distribution for each disability category that would have been obtained in the absence of type 1 nonresponse bias.
- Respondents from all three groups were combined and weighted up to the universe by disability category. Weights were computed within strata used to select the sample (i.e., LEA size and wealth, student disability category and age).
- Weights from three low-incidence disability categories (deaf, orthopedically impaired, and visually impaired) were adjusted to increase the effective sample size. These adjustments consisted primarily of slightly increasing the weights of students in larger LEAs and decreasing the weights of students in smaller LEAs. Responses before and after these weighting adjustments were nearly identical. In addition, because there were only three deaf/blind youth from medium-size or smaller districts, and they had large weights, they were removed from the sample to increase the effective sample size. Thus, NLTS results do not represent the very small number of deaf/blind students in medium-size or smaller LEAs.
- The resulting weights were adjusted so that each disability category exhibited the appropriate income distribution estimated in step 1 above. These adjustments were of modest magnitude (relative to the range of weights within handicapping condition); the weights of the poorest respondents were multiplied by a factor of approximately 1.6, and the weights of the wealthiest respondents were multiplied by a factor of approximately .7.

Estimation of Standard Errors

The statistical tables in this report present data for various subgroups of youth with disabilities. Most of the variables presented in the tables are reported as percentages of youth. In some cases, rather than percentages, the figures refer to means, such as the mean age of youth contacting VR. Percentages and means are weighted to represent the national population of youth with disabilities and youth in each disability category. However, the percentages and means are only estimates of the actual percentages and means that would be obtained if all youth with disabilities were included in the study. These estimates vary in how closely they approximate the true measures that would be derived from a study of all youth. To aid the reader in determining the precision of the estimates, for each percentage and mean the tables present the approximate standard error and the unweighted number of cases on which the statistic is based.

The standard errors for the NLTS were computed using procedures that differ from standard calculation routines. Such routines assume a simple random sample. However, the NLTS used a stratified cluster sample design, which introduces design effects that reduce the precision of estimates for a sample of a given size, compared with a simple random sample. The design effects within the NLTS affect the precision of estimates to varying degrees for different subpopulations and different variables. Pseudo-replication is widely accepted as a variance estimation technique in the presence of design effects. However, it is not cost-effective for estimating the standard errors of the thousands of variables and subpopulations tabulated in the numerous NLTS reports and its statistical almanacs. Therefore, pseudo-replication was

conducted on a limited number of variables to calibrate a cost-effective approximation formula, using the following procedures:

- A set of 25 variables representing the parent interview, school program survey, and record abstract was identified for the purpose of developing a statistical approximation formula; these included 16 nominal variables and 9 continuous variables.
- Standard errors of the weighted means of the selected variables were estimated in two ways. The first procedure involved pseudo-replication. For each variable, standard errors were calculated for students in each handicap category and for the total sample (300 standard errors) using a partially balanced experimental design specifying how students were to be allocated to 16 half-samples. The sample was split on the basis of the school districts and special schools from which youth were originally sampled. Districts and schools were paired on the basis of enrollment and a measure of poverty, and one member of each pair was assigned to each half-sample. Sample weights for students were computed for each half-sample as if those in the half-sample were the only study participants.

  The following formula was used to estimate the standard error of the mean for students in all conditions:

  $$\text{Standard error} = [(1/16)\ \Sigma_i\ (M_i - M)^2]^{1/2}$$

  where M_i is the mean calculated for students in one of the 16 half-samples), M is the mean response calculated from the full sample, and the summation extends over all 16 half-samples. (Note that responses to questions from the school program survey were attached to the records of students in the responding schools so that means for these items were computed using student weights.)
- The second estimation procedure involved an approximation formula based on an estimate of the effective sample size for each disability category and the total sample. The sampling efficiency (E) for a group was calculated using the following formula:

  $$E = M_W^2/(M_W^2+S_W^2)$$

  where M_W and S_W are the mean and standard deviation of the student weights over all members of the group. The approximation formula for the standard error of the weighted mean of nominal variables is:

  $$\text{Standard error} = [P(1-P)/(E \times N)]^{1/2}$$

  where P is the full-sample weighted proportion of "yes" responses to a particular question in the group, N is the unweighted number of "yes" or "no" responses to the question in the group, and E is the sampling efficiency of the group. The approximation formula for the standard error of the mean of a continuous variable is:

  $$\text{Standard error} = [S^2/(N \times E)]^{1/2}$$

  where S^2 is the variance of responses in the group for the continuous variable (computed with frequencies equal to full-sample weights) and N is the unweighted number of respondents to the question in the group. These formulas were used to compute a total of 300 standard errors for the same variables and groups addressed using pseudo-replication.
- To assess the accuracy of the standard errors produced by these formulas, we used scatter plots to compare them with standard errors produced using pseudo-replication. For both nominal and continuous variables, the approximate best fit was a 45-degree line. That is, on average, the formula based on estimates of effective

sample size neither systematically overestimated nor underestimated the standard error obtained using pseudo-replication, arguing for use of the more cost-effective estimation formulas. However, because error remains in the estimates that might result in underestimating the true standard errors in some instances, we took a conservative approach and multiplied the standard errors produced using the estimation formulas by 1.25. The vast majority of the standard errors so obtained were larger than the standard errors obtained by pseudo-replication. Thus, the standard errors were calculated using the effective sample size estimation formulas and increased by a factor of 1.25.

Multivariate Analysis Techniques

Most of the descriptive analyses presented in this report are based on crosstabulations of two or three variables. However, interrelationships among variables limit our ability to disentangle the independent relationships among intercorrelated independent variables and an outcome of interest. Multivariate analysis techniques have been employed when our purpose was this identification of independent relationships. Multivariate analysis is an invaluable analytic technique in the social sciences precisely because of its ability to disentangle the separate impacts of multiple predictor variables. Suppose, for example, that we were interested in knowing the relationships that family SES and minority status have to students' school performance. Because family SES and minority status are themselves interrelated, we would need some way of distinguishing between the separate effects of each factor. Multivariate analysis techniques perform this function. Ordinary least squares regression analysis and logit analysis are the two techniques that have been used in this volume; each is discussed below.

Ordinary Least Squares Regression Analysis

Ordinary least squares regression analysis is used to consider the relationships of a variety of independent variables to a continuous dependent variation, such as the average number of days students were absent from school in their most recent school year (Chapter 4). Ordinary least squares regression analysis is based on the following form of model:

$$Y = a + b_1X1 + b_2X2 + e \qquad (1)$$

where:

Y is the outcome variable, which in this case we measure as the number of days a student was absent,

X1 and X2 are the independent variables. In this example, let us suppose that the first of these is the family's annual income and the second is coded 1 for those who are members of minority groups, and 0 for nonminorities,

a, b_1 and b_2 are coefficients to be estimated, and

e is the error term, reflecting the fact that an outcome generally will not be completely determined by the included independent variables (i.e., there is a stochastic component to the relationship).

The coefficients, b_1 and b_2, represent the separate effects of family income and minority status, independent of the influence of the other. Specifically, b_1 represents the effect of family

income on absenteeism, holding constant the effect of minority status (i.e., it represents the effect of family income among students who either were all minority or all nonminority), and b_2 represents the effect of being minority rather than nonminority among youth whose families all had equivalent incomes. These coefficients can be readily interpreted as showing the amount by which the outcome is expected to change for each one-unit change in the independent variable. Thus, if family income were measured in thousands of dollars, a student's absenteeism would be expected to change by amount b_1 for each one thousand dollar increase in family income.

Of course, other techniques also could have been used to sort out these separate impacts. A three-way crosstabulation (categories of grade point average by categories of household income by minority status), for example, also would be very informative and for many purposes might be preferred (e.g., in descriptive or exploratory work when our knowledge of the nature of the relationship between independent and dependent variables is weak). But the use of crosstabulations often will confront us with dwindling cell sizes for all but the simplest problems, and regression analysis generally yields significance tests that are substantially more powerful, in a statistical sense (i.e., we are less likely to fail to reject the null hypothesis of no relationship when there really is a relationship).

The advantages of regression analysis can be fully realized, however, only if its underlying assumptions hold. Among these assumptions are that the equation correctly specifies the relationship between the independent and outcome variables and that the error term, e, has an expected value of zero and a constant variance. Although regression is robust in the face of violations of these assumptions, the case of dichotomous dependent variables gives rise to problems that are especially egregious for at least several reasons:

1. The assumption of linearity seems untenable. Regression techniques assume that the effect of each variable is constant throughout all of its own values and all values of the other variables. For example, in the equation above, it is assumed that the effect of family income, b_1, is the same for minority and nonminority youth, and, further, that absenteeism is affected equally regardless if the one-unit change in family income represents a difference of $10,000 and $11,000 or a difference of $50,000 and $51,000. Similarly, the difference between the expected days absent of minority and nonminority youth is estimated to equal b_2, regardless of whether we are evaluating the difference among youth who are high-income or low-income.

The assumption of linearity may hold at least approximately in many cases, and slight adjustments to a regression model (e.g., the inclusion of quadratic terms) can make necessary accommodations in many other instances. But, in the case of dependent variables that are dichotomous, the linearity assumption seems especially untenable. Let us modify out example above by assuming that the outcome is a dichotomous variable coded 1 for youth who dropped out of high school and 0 for those who persisted (an analysis performed in Chapter 5). Using regression analysis in this case, we would be modeling the probability that a youth will drop out. Because a probability must be bounded between 0 and 1, we would expect that, in cases where the expected probability of dropping out is already very high or very low (e.g., due to values on

other independent variables in the equation), even very large changes in the value of an independent variable can generate only very modest changes in the expected probability of dropping out. In other words, the effect of further changes in any independent variable, we would expect, will have asymptotically diminishing effects as the value of the expected probability of dropping out approaches 0 or 1. This implies a violation of the linearity assumption, however, because regression analysis makes no such provision.

2. Expected values of the outcome that are out-of-range. Because regression analysis makes no such provision, one could conceivably end up with predicted values on the outcome variable that exceed 1 or that are less than 0, a nonsensical result.

3. The assumption of constant variance does not hold. The assumption that the error term in the above equation has a constant variance is necessarily violated in the case of dichotomous dependent variables. Violation of this assumption is known as heteroscedasticity.

Logit Analysis: An Alternative to Regression

Fortunately, other techniques have been devised specifically for the multivariate analysis of dichotomous dependent variables. One used extensively in this volume is logit analysis. Logit analysis has been used in analyses of whether youth received failing course grades and whether they were retained at grade level (Chapter 4); whether youth dropped out of school, rather than persisting (Chapter 5); whether youth were socially isolated from friends, saw friends frequently, belonged to school groups, or ever were arrested (Chapter 6); whether out-of-school youth had achieved residential independence (Chapter 7); whether out-of-school youth had achieved competitive employment (Chapter 8); whether out-of-school youth had enrolled in a variety of kinds of postsecondary schools (Chapter 9); and whether out-of-school youth had become engaged in productive work- or school-related activities outside the home (Chapter 10).

Logit analysis deals with the complications of nonlinearity inherent in regression analysis by transforming the outcome variable. Regression analysis models the <u>probability</u> of dropping out as a function of the independent variables, and this is what causes the problems described above. Logit analysis circumvents these problems by modeling the <u>log odds</u> of dropping out. The log odds, often denoted Z, is defined as:

$$Z=\ln[P/(1-P)] \quad (2)$$

where P is the probability of the outcome occurring (for example, the probability that a youth will drop out). As P approaches 1, Z approaches plus infinity; and as P approaches 0, Z approaches negative infinity. In logit analysis, Z is then modelled as a linear function of the Xs, the independent variables. Thus,

$$Z = a + b_1X1 + b_2X2 + e \quad (3)$$

Using maximum likelihood methods, the estimators for the coefficients in the above equation have desirable properties. But, whereas coefficients estimated from regression analysis are

easily interpretable, as already described, coefficients from logit analysis lack straightforward interpretation for at least two reasons.

1. The dependent variable is a log odds. The coefficients, b_1 and b_2, represent the expected change in the log odds of the outcome for a one-unit change in the independent variables. Few people have an intuitive sense for what a change in the log odds by amount b_1 means.

2. Effects on probabilities are nonlinear. We can greatly ease interpretability by converting changes in log odds into changes in estimated probabilities. But, because Z is a nonlinear transformation of the probability of an outcome, the independent variables also are nonlinearly related to P. This means that there really is no single answer to the question of how changes in the value of an independent variable affect the probability of dropping out. In other words, the effect of a one unit change in an independent variable (X1) on the probability of dropping out depends on the initial value of the independent variable and on the values of all other independent variables in the equation.

Converting logit coefficients to changes in estimated probabilities is necessarily somewhat arbitrary, therefore. One common approach, and the one followed throughout this volume, is to compute the expected values of Z when an independent variable is specified at two (or more) conceptually interesting values, while using mean values on all remaining independent variables, to next convert these Z values to probabilities, and then to take the difference. For dichotomous independent variables, these two alternative values would obviously be zero and one (i.e., the persons has the attribute in question or does not); for continuous independent variables, one value above the mean and one below the mean might be used.

For example, using equation (3) above, we would first estimate the equation to derive coefficients a, b_1 and b_2. The impact of family income, thus, represents the amount by which the log odds of dropping out is expected to change for a one-unit change in family income; similarly, b_2 represents the amount by which the log odds of dropping out is expected to change for youth who are minorities rather than nonminorities. To convert the effect of minority status to an impact on predicted probabilities, we might substitute mean family income for X1, use, alternately, 0 and 1 as the values of minority status, and compute the expected value of Z for each case by multiplying through the equation. Each of these Z values could then be converted to a predicted probability of dropping out (by solving for P in equation 2, above), and they would then represent, respectively, the predicted probability of dropping out for minority and nonminority youth whose families where of average SES. The effect of minority status on dropping out at the mean value of family income is given by the difference in these predicted probabilities.

We could evaluate the effect of family income very similarly, by substituting the mean value of minority status for X2 (approximately .20 in our sample) and choosing alternate values of family income in turn--say, 12 and 18 (assuming income is measured in thousands of dollars). We would then solve the equation for the two values of Z and convert these two into estimated

probabilities. The difference between the two probabilities would then represent the change in the probability of dropping out of changing family income from $12,000 to $18,000, at the mean value of minority status. In each of the logit analyses presented in this volume, we present both the coefficients, the estimated change in the probabilities, calculated as noted above, and the increment of the independent variable for which the change was calculated.

Creating Comparison Groups from the General Population of Youth

We have created two comparison groups from the general population of youth to use as benchmarks against which to interpret outcomes of youth with disabilities. The first group is a sample of youth from the general population, based on data from the National Longitudinal Survey of Youth (NLSY, U.S. Department of Labor). This group permits us to identify differences between youth with disabilities and the general population. However, we cannot attribute those differences to the presence of a disability because Chapter 2 has illustrated that youth with disabilities differed from youth in the general population on demographic characteristics that would be expected to influence their outcomes (e.g., gender, ethnicity). Hence, a second comparison group was constructed from the NLSY that has the same distribution as youth with disabilities on important demographic variables. The construction of these two groups is described below.

The NLSY contains data for more than 12,000 noninstitutionalized youth who were between the ages of 13 and 21 in 1979. These youth have been interviewed annually from 1979 to the present concerning a wide variety of topics, including their family background, schooling, employment, marital status, and living arrangements. For the present study, data from the 1979-1983 interviews were used; after those years, youth in the NLSY were generally older than youth in the NLTS.

Because the universe of the NLTS is youth who were in special education programs in 1985-86, while the universe for the NLSY is all youth (regardless of present or past school status), the following steps were taken to achieve comparability. First, only NLSY youth who were currently in school or had been in school during the current or previous academic year were included in the analysis. Second, comparisons were restricted to youth between 15 and 20 years of age. This was done primarily because very few NLSY youth over age 20 met the requirement of having been in secondary school the academic year before the interview. Little is lost by this restriction because the NLTS sample contains very few individuals below the age of 15 and relatively few over age 20.

Thus, we used all the in-school observations and any observations when a person was out of school, but had been in school during the academic year before the interview. There were up to 5 in-school interviews for a given youth. For most people, only one out-of-school observation was included. Two out-of-school interviews could occur if a youth left school during an academic year but before the spring interview. In that case, the interviews of the spring of that academic year and the next spring were included.

NLSY provides sampling weights based on respondents' probability of selection. However, our use of multiple observations per respondent for many analyses resulted in older youth being overrepresented. We corrected this bias by multiplying each individual's weight by:

$$\frac{\text{Weighted N of individuals of the youth's age in 1980}}{\text{Weighted N of the youth's age for all observations in the sample.}}$$

For analyses that used multiple observations, this weight was used. For analyses that used one observation only (for instance, data on arrests came only from the 1980 interview), the original weight supplied by the NLSY was used.

As indicated above, youth with disabilities differ in several demographic characteristics from the general population of youth. The comparison group we constructed to "hold constant" these differences was formed by weighting the NLSY data to match the distribution of selected demographic characteristics of youth with disabilities. Using these weights, the comparison population has the same distributions of gender, ethnicity, and head of household's education as the population of youth with disabilities.

Despite our adjustments, some important noncomparabilities remain. They are as follows:

- *Respondent.* NLTS interviewed parents, while NLSY interviewed youth. Although there is some evidence that parents in the general population tend to underreport the employment activities of their teenage children (Freeman and Medoff, 1982), the extent to which parents and youth differ in reporting other phenomena is not known.
- *Month of interview.* The modal month of interview was August for the NLTS and March for the NLSY. The two outcomes most affected by differences in timing of interview are school completion status and employment status. Fortunately, NLSY data included youths' employment status as of August 15, and we were able to construct a variable on school completion status as of the summer after the interview. However, most data on occupational distributions, part-time/full-time status, and wages come from the summer for NLTS youth and the spring for NLSY youth.
- *Year of interview.* NLTS interviews took place in 1987, while NLSY data come from 1979-1982. Readers should be sensitive to the fact that period effects may have influenced some variables. We adjusted for period effects for only one variable, wages, by operationalizing wages as the percent of the population earning the minimum wage or less.
- *Time out of school.* The most important consequence of differences in the month of interview affect analyses of data for youth who were no longer in secondary school. More than three-fourths (76%) of NLSY secondary school graduates in the sample (weighted) had been out of school between 9 and 11 months when they were interviewed. In contrast, about 56% of NLTS graduates had been out of school about 2 months, and about 44% had been out of school about 14 months.

- *Unmeasured or uncontrolled demographic differences.* The groups may continue to differ in unmeasured ways or in ways that were not adjusted for in the reweighting. For example, we were not able to weight the comparison population by urbanicity, despite knowing that NLTS and NLSY samples differ significantly on this factor, because of noncomparability of the measures of urbanicity in the two data sets.
- *Exact wording of questions and response categories.* Wording of questions and response categories differed between the NLTS and the NLSY. Considerable research has shown responses to items can be affected by these types of differences (e.g., Schwarz and Hippler, 1990).

Caveats to Users of the Data

To minimize the potential that data in this report will be misinterpreted, the reader should keep in mind the following considerations.

- *Estimation of Sampling Errors.* The data tables contain approximate standard errors for means and percentages. Users should interpret data in light of the standard errors. Percentages or means based on subgroups with relatively few cases have a considerably greater margin of error than those based on larger subgroups.
- *Subgroup Definitions.* Results are often calculated for subgroups of youth; readers should be clear about the subgroup to which data refer to avoid misinterpreting findings.
- *Sources of Data and Data Reliability.* Each table indicates the source of the data reported in it (e.g., parent interview). The confidence the reader places in the data should be based in part on a recognition of their source. The accuracy of parent reports about their adolescent or adult children may vary depending on the subject of an item. For example, parents were expected to be quite accurate reporters of data on family characteristics, but to be less aware of--and, therefore, report less accurately on--the kinds of services their children were provided in school or by other agencies. When two sources of data were available for a given item (e.g., parent reports and school record indications of whether the youth graduated or dropped out), a high level of agreement was found for many variables, while for other items, larger discrepancies were noted. Such discrepancies were resolved using decision rules reported elsewhere (see Appendix B and Wagner, D'Amico, and Marder, 1991). However, for most items, only one source of data was available, making it impossible to verify the accuracy of the responses.
- *Missing Data.* Missing data result from item nonresponse, the absence of the whole instrument from which an item was taken, or a logical skip of an item because it was inappropriate to a particular respondent (e.g., some items were asked only of parents of youth with particular kinds of disabilities). Missing data of all kinds were eliminated from calculations of percentages and means. Hence, the reported percentages and means are based on those for whom the question was appropriate and who answered the question. The approximate standard errors increase as the sample size decreases, drawing the user's attention to statistics that are based on particularly small samples.

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Appendix B

VARIABLE DEFINITIONS AND CONSTRUCTION

Appendix B

VARIABLE DEFINITIONS AND CONSTRUCTION

This appendix describes the sources and construction of the factors included in multivariate analyses.

Individual/Household/Community Characteristics

Disability-Related Characteristics

- *Disability category.* Information on the nature of youths' disabilities were gathered from three sources. The original designation of youths' primary disabilities that was the basis for their being sampled for the NLTS came from rosters of secondary special education students submitted by districts included in the study. In addition, parents were asked in telephone interviews: "For what learning problems or other disabilities has (NAME) gotten special services? Which of these has been (NAME'S) main learning problem or disability?" Finally, data collectors who abstracted information from students' school records were asked to record all disabilities for each student that were designated in the school record or IEP.

  For all crosstabulations throughout this report, youth are assigned to a a disability category based on the primary disability designated by the youth's school or district in the 1985-86 school year. Descriptive data are nationally generalizable to youth who were classified as having a particular disability in the 1985-86 school year.

  In multivariate analyses, somewhat different groupings were used because our purpose was different. Rather than present findings for youth in a particular category, the purpose of using variables designating disability categories in multivariate analyses was to identify the independent effects of having a particular kind of disability. For this purpose, it was important to eliminate some of the measurement variability within the categories; e.g., some youth with IQs that exceeded their state's limit for designation as mentally retarded were still classified as mentally retarded, whereas other youth with the same IQ from a different district in the same state were classified as learning disabled . This kind of variability reduces the power of the variables to distinguish significant differences in outcomes. Hence, we sought to establish somewhat more homogenous groupings of youth, in essence imposing a more standard definition of a disability on the variability that exists naturally.

  We also sought to resolve several apparent discrepancies between our three sources of data regarding the nature of youths' disability or disabilities. For example, some reports of youths' disabilities that were taken from their individual school records in 1986-87 differed from the disability classification reported for them by their school district in 1985-86, indicating a change in their classification.

  Further, having three sources of data extended our picture of the disabilities of some youth. For example, in the case of school districts that used a single category of "hearing impaired" rather than two categories distinguishing deaf and hard of

hearing, additional data helped us to recategorize youth who were deaf into that category. Overall, 14% of youth were recategorized for multivariate analysis purposes only.

We also sought to reduce the number of disability categories to establish greater parsimony in the multivariate analyses. In particular, the category of deaf/blind was so small that it could not function usefully in the analyses. Youth in that category also functioned very similarly to youth in the multiply handicapped category, to those who were severely/profoundly mentally retarded, and to youth within the other health impaired category who were designated as autistic. Thus, we created a category of "severely impaired," which contains youth with multiple handicaps, severe/profound mental retardation, autism, and those who were deaf/blind.

- *Functional mental skills.* Parents were asked: "How well does (NAME) do each of the following things on his/her own, without help? Look up telephone numbers in the phone book and use the phone; tell time on a clock with hands; read and understand common signs like STOP, MEN, WOMEN, OR DANGER; count change. (FOR EACH TASK) Would you say very well, pretty well, not very well, or not at all well?" A scale was formed by assigning a value of 4 to "very well." 3 to "pretty well," 2 to "not very well" and 1 to "not at all well." Scores were summed for the 4 tasks to create a scale ranging from 4 to 16.

  For multivariate analyses, in which maintaining a maximum sample size was a major concern, youth who were missing a single item in the scale were imputed a value on that item by predicting a value for the single missing item using the three present components of the scale, the disability category of the youth, and age (n=185).

- *Self-care skills.* Parents were asked the following item in telephone interviews: "How well does (NAME) do each of the following things on his/her own, without help: dress him/herself completely; feed him/herself completely; get places outside the home, like to school, to a nearby store or park, or to a neighbor's house. Would you say he/she does it very well, pretty well, not very well, or not at all well?" Values were assigned as with the functional mental skills scale and summed for the 3 tasks to create a scale ranging from 3 to 12. For multivariate analyses, in which maintaining a maximum sample size was a major concern, youth who were missing a single item in the scale were imputed a value on that item using a regression equation that included the two present components of the scale, the disability category of the youth, and age.

  This question was asked only of parents of youth who were classified as mentally retarded, visually impaired, deaf, orthopedically impaired, other health impaired, multiply handicapped, or deaf/blind. They were not asked of parents of youth who were classified as learning disabled, emotionally disturbed, speech impaired, or hard of hearing, with no other disabilities because such disabilities were assumed not to interfere in most cases with the performance of the basic self-care skills being investigated. Youth in these categories were assigned a value corresponding to "very well" for each item, which would sum to a score of 12 (high) on the corresponding scale. If the skills of youth in these categories actually were lower, the reported self-care skills scores would overestimate abilities.

- *Measured IQ.* IQ scores were taken from students' school records for their most recent year in secondary school and recorded on the school record abstract form. IQ data were not available for all youth and the fraction of students for whom IQ scores were available varied considerably for youth in different disability categories. For example, IQ scores were present in school records for 86% of youth classified as mentally retarded, but for only 47% of youth with other health impairments. The relatively high rate of missing data for youth in some categories raised the question of whether available IQ scores were systematically biased downward.

  To address this issue, the functional ability levels were compared for youth with and without IQ scores in each disability category. To the extent that functional ability correlates with measured IQ ($r=.54$; $p<.001$), bias would be indicated if lower functional ability scores were observed for youth with IQ scores and higher functional ability scores for youth without IQ data. For youth classified as emotionally disturbed, hard of hearing, learning disabled, or visually impaired, there were no significant differences between youth with and without IQ test scores, indicating an absence of bias for those youth. However, youth classified as orthopedically impaired, other health impaired, or speech impaired with IQ data had significantly lower functional mental skills scale scores than those for whom IQ data were unavailable ($p<.05$). Thus, there appears to be a downward bias in the IQ scores for those youth. An opposite relationship of functional abilities and IQ was observed for youth in the deaf/blind, multiply handicapped, and mentally retarded categories. For them, functional abilities were significantly higher for youth with IQ scores ($p<.001$). For these categories, an upward bias in IQ scores is apparent.

  In multivariate analyses, data were imputed for some missing cases by predicting a value for IQ based on an regression equation predicting IQ as a function of the primary disability category, whether the youth was mildly, moderately, or severely mentally retarded as a secondary disability, the functional mental skills scale score, ethnic background, and household income.

Demographics

Specific demographic variables and their sources are included in Table B-1.

Characteristics of Youths' Secondary Schools/Programs

We also consider several aspects of schools, their policies, and the educational programs students experience there to understand their relationships to transition outcomes of youth with disabilities:

- *Took occupationally oriented vocational education.* The variable indicating whether the youth took occupationally-oriented vocational education is drawn from school records and/or parent interviews.

  The school record item involved a listing of courses the student took in the most recent school year. If a vocational course was listed the abstractor was asked to circle on an extensive list of labor market areas the type of training the student received (e.g., agricultural, distributive education, office occupations, prevocational skills). If a specific labor market area was circled, the student's vocational education was considered to be occupationally specific.

Table B-1
DEMOGRAPHIC VARIABLES USED IN NLTS ANALYSIS

Variable	Source	Values	Definition/Construction
Gender	Parent interview	1	Male
		2	Female
Ethnicity	Parent interview	1	Black
		2	White
		3	Hispanic
		4	American Indian/Alaskan Native
		5	Asian/Pacific Islander
Youth's age	Parent interview or school record	15-24	In analyses of youth outcomes or activities in 1987, age in 1987 is used. Analyses of experiences in the most recent school year (e.g., grades received), age in that school year is used.
Head of household's highest education	Parent interview	1	Less than high school
		2	High school graduate
		3	Some college or associate degree
		4	College graduate
		5	Postgraduate education
1986 household income	Parent interview	1	Less than $12,000
		2	$12,000 to $19,999
		3	$20,000 to $24,999
		4	$25,000 to $37,999
		5	$38,000 to $50,000
		6	$50,000 or more
Youth came from single-parent household	Parent interview	1	Single-parent household
		2	Two-parent household
Community location*	Quality Education Data (QED)	1	Urban
		2	Suburban
		3	Rural

* Community location reflects the community in which the youth attended secondary school.

In addition, parents were asked: "What kinds of job training or help has (NAME) had in the past 12 months? Has he/she had testing to find out his/her work interests or abilities; training in specific job skills, like care repair or food service; training in basic skills needed for work, like counting change, telling time, or using transportation to get to work; career counseling (like help in figuring out jobs (NAME) might be suited to; or help in finding a job or learning to look for one." They also were asked to indicate, for each kind of vocational assistance, who provided it; responses (not read to the parent) included the youth's secondary school.

If parents indicated youth had received training in specific job skills in the previous year and the source was the youth's school, the youth was coded as having taken occupationally specific vocational education.

For 16% of cases, the variable was based on the school record alone; for 21% of cases it was based on the parent interview alone. For 63% of cases, both sources were available. In the event of discrepancies, a student was coded as having taken occupationally oriented vocational education if either the school record or the parent interview met the criteria for a positive response.

- *Percentage of instructional time in regular education.* Data on class placement was taken from students school records. Data abstractors indicated for each class taken in the most recent school year the amount of time spent per week in the class, the number of semesters the class was taken, and whether it was regular or special education. The total amount of class time was calculated by multiplying the hours per week by the semesters taken and summing over all classes. A similar calculation was then made for all courses taken in regular education. The percentage is calculated by dividing the time spent in regular education classes by the total amount of class time.

- *Attended a special school.* We have included in these analyses a dichotomous variable indicating whether the student attended a special school, to distinguish the outcomes of those students from youth who had attended regular secondary schools. Data were taken from the Survey of Secondary Special Education Programs (school administrators reported the schools was a comprehensive high school, a special school for students with disabilities, a magnet school, a vocational school, or another type of school.) or from students school records (indicating the primary educational placement of the student was a special school.

- *School size.* The Survey of Secondary Special Education Programs asked school administrators to report the average daily attendance at the school (number of students typically attending).

- *Mainstreamed students were expected to keep up in regular education classes without help.* The Survey of Secondary Special Education programs asked school staff: "When your school mainstreams special education students, are they usually expected to keep up with the rest of the class without special help?"

- *Whether regular education teachers with mainstreamed students were given support.* Data were taken from the Survey of Special Education Programs, which asked administrators to report whether the following forms of support were made available

to regular education teachers when special education students were mainstreamed into their classes: inservice training on mainstreaming, smaller class size, special materials to use with mainstreamed students, and aides in the classroom.

- *Enrollment in nonacademic courses.* Data were taken from students' school records for their most recent school year. Nonacademic classes include art, music, physical education and electives such as drivers' education. Students were coded as 1 if they took at least 1 such course in their most recent school year.

- *Receipt of support services.* Tutoring assistance and personal counseling are two forms of support for students that may be effective in ameliorating poor school performance. For each kind of service. the NLTS determined whether the service had been received in the previous year from the youth's secondary school. The two sources of data were parent interviews and school records. Parents were asked: "Has (NAME) ever had (kind of service)? Has (NAME) had any of this (kind of service) in the past 12 months? Who has given (NAME) (kind of service) in the past 12 months?" (Response categories, not read to the parent, included, among other sources, "youth's junior or senior high school", and "special secondary school for the disabled.")

  The school record abstract source involved the following item: "Which of the following services did the student receive from or through the school system (this can include contracted services) during the school year indicated on the cover sheet?" An extensive list of services included personal counseling/therapy and help from a tutor/reader/ interpreter.

  Responses for approximately 16% of cases were based on the school record alone, 25% on the parent interview alone, and 59% on both sources. In cases having two sources for these variables, there was agreement in 46% of cases regarding receipt of counseling/therapy and 59% of cases for help from a tutor/reader/interpreter. Decision rules for resolving discrepancies are reported in Wagner et al., 1991.

- *Number of courses for which grades were received.* Data were taken from students' school records for their most recent school year. For each class taken, record abstractors reported the course grade or indicated the class was ungraded. Graded courses were summed to create this variable.

Student Activities/Behaviors

The dependent variables included in these analyses include the following:

- *School absenteeism.* Absenteeism data were collected from students' school records for their most recent school year. Record abstractors responded to the following question: "During the school year indicated on the cover sheet, how many days was this student absent, excluding days suspended? If days aren't available, indicate the number of classes the student was absent." Classes absent were converted to days absent by dividing the number of classes by 7, the average number of classes in a full secondary school day. Data were missing from 15% of abstracts. Analysis of missing data revealed no significant differences between

students with data present and those with data missing in their disability category, grade level, functional abilities, IQ score, type of school attended, or grade point average.

- *Receiving a failing course grade.* This dichotomous variable was constructed from students' school records for their most recent school year. For students receiving any course grades; a code of 1 was assigned if a student had failed any course (for either a single semester or a full year) and 0 if no course had been failed.

  There are two reasons to suspect that the grades abstracted from students' records may overestimate grade performance. First, not all students received grades. Understanding which students received grades and which did not is important in interpreting course grades.

  NLTS data reveal that 11% of students with disabilities did not receive grades in any courses in their most recent year in secondary school. The receipt of grades is strongly associated with the nature and severity of students' disabilities. For example, 55% of students with low functional mental skills did not receive grades, compared with only 4% of students with high functional mental skills. Hence, course grades "cream" the special education student population by eliminating students with more severe disabilities and lower functional skills. Because students who did receive grades were the more capable students in special education, we would expect grades to be generally higher and more similar to students in regular education than would be the case if all students in special education were considered.

  Second, there may be a reporting bias in grade data. For students who were taking a single course for two semesters and received two different grades, record abstractors were instructed to record the more recent grade. However, when transcripts were obtained for a subsample of students and compared with grades recorded by abstractors, 34% of the 157 cases reviewed showed discrepancies between transcript grades and record abstract grades. The majority of these cases involved abstractors reporting the higher of 2 grades received for 2-semester courses, rather than the most recent grade. Generally only 1 course per student was involved in a grade discrepancy and the grade change was virtually always only 1 grade point (i.e., a B reported as the higher grade when a C was the most recent grade). To the extent that a failing grade was omitted and was the only such grade in the school year, we are underestimating the extent of course failure. Further, in a handful of cases, failed courses were not included on the record abstract form because students received no credit for them However, because the subsample used for this comparison was small and included students from only four disability categories, it is unknown to what extent the tendency to record the more favorable grade or to omit failed courses pervades the grade data analyzed here for the full sample.

- *Dropping out of school.* The dropout variable is coded 1 if youth who had left school in the 1985-86 or 1986-87 school years had left school by dropping out or 0 if they still were in school or had graduated or aged out. Students who had been permanently suspended or expelled were not included in these analyses.

  This variable was derived from either parent interviews and/or school record abstracts. Parents were asked to indicate whether youth were still in school and, if not, whether they had left school by graduating, voluntarily leaving (dropping out), being suspended or expelled, or being older than the school age limit (aging out).

The school record abstract asked abstractors to report the student's status at the end of the school year. Possible responses included: graduated, exceeded the school age limit, completed the school year and promoted to the next grade level, completed the school year but not promoted to the next grade level, dropped out, permanently expelled, transferred/moved to another school, and incarcerated, institutionalized due to handicap.

For 30% of cases, school completion status was based on the parent interview alone. For 16% of cases, values were based on the school record abstract alone. For the 55% of cases in which both the parent interview and the school record abstract were available, there was agreement between the two sources on the youth's completion status for 78% of cases. The rules for resolving discrepancies for the remaining cases are reported in Wagner et al., 1991).

A further category of factors expected to relate to school performance and employment involves youths' activities or behaviors. We have included the following factors:

- *Group membership.* Parents reported whether students had belonged to a school or community group in the preceding year in telephone interviews.

- *Frequency of seeing friends.* Parents of students still in secondary school were asked about how many days a week the student usually got together with friends outside of school.

- *Having had disciplinary problems.* The NLTS has constructed a variable indicating whether parents reported youth had had one or more of the following disciplinary problems: being suspended or expelled from school in the previous year, being fired from a job in the previous year, or ever being arrested. This variable is a gross indicator of youth who exhibited behaviors suggesting they had trouble abiding by rules needed to maintain their social roles as students, workers, or members of society generally.

- *Student employment.* The NLTS has included a variable measuring whether parents reported the student had a paid job in the preceding year (this might have included work-study jobs).

- *Being older than the typical age-for-grade.* Student age was obtained from school rosters or parents; grade level was obtained from school records for the most recent school year. The typical age was assumed to be 18 for 12th graders, and 1 year younger for each earlier grade level. Seventy-six percent of secondary students with disabilities were older than the typical age of students at their grade level, suggesting that many of them had been retained in grade previously.

Appendix C

OTHER PRODUCTS AVAILABLE FROM THE NLTS

Appendix C

OTHER PRODUCTS AVAILABLE FROM THE NLTS

The National Longitudinal Transition Study of Special Education Students Statistical Almanacs:

- Volume 1: Overview
- Volume 2: Youth Categorized as Learning Disabled
- Volume 3: Youth Categorized as Emotionally Disturbed
- Volume 4: Youth Categorized as Speech Impaired
- Volume 5: Youth Categorized as Mentally Retarded
- Volume 6: Youth Categorized as Visually Impaired
- Volume 7: Youth Categorized as Hearing Impaired
- Volume 8: Youth Categorized as Orthopedically Impaired
- Volume 9: Youth Categorized as Other Health Impaired
- Volume 10: Youth Categorized as Multiply Handicapped

The National Longitudinal Transition Study of Special Education Students: Report on Sample Design and Limitations, Wave 1 (1987)

The National Longitudinal Transition Study of Special Education Students: Data Tape and Documentation

Parents' Reports of Students' Involvement with Vocational Rehabilitation Agencies in the First Years After Secondary School: A Report from the National Longitudinal Study of Special Education Students

The Transition Experiences of Youth with Disabilities: A Report from the National Longitudinal Study of Special Education Students

Youth With Disabilities: How Are They Doing? The First Comprehensive Report from the National Longitudinal Transition Study of Special Education Students

The National Longitudinal Transition Study of Special Education Students: Report on Procedures for the First Wave of Data Collection (1987)

The Early Work Experiences of Youth with Disabilities: Trends in Employment Rates and Job Characteristics

Prices and order information are available upon request. SRI International, National Longitudinal Transiton Study of Special Education Students (NLTS), Building B, Room S128, 333 Ravenswood Avenue, Menlo Park, CA 94025. (415) 859-3403.

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